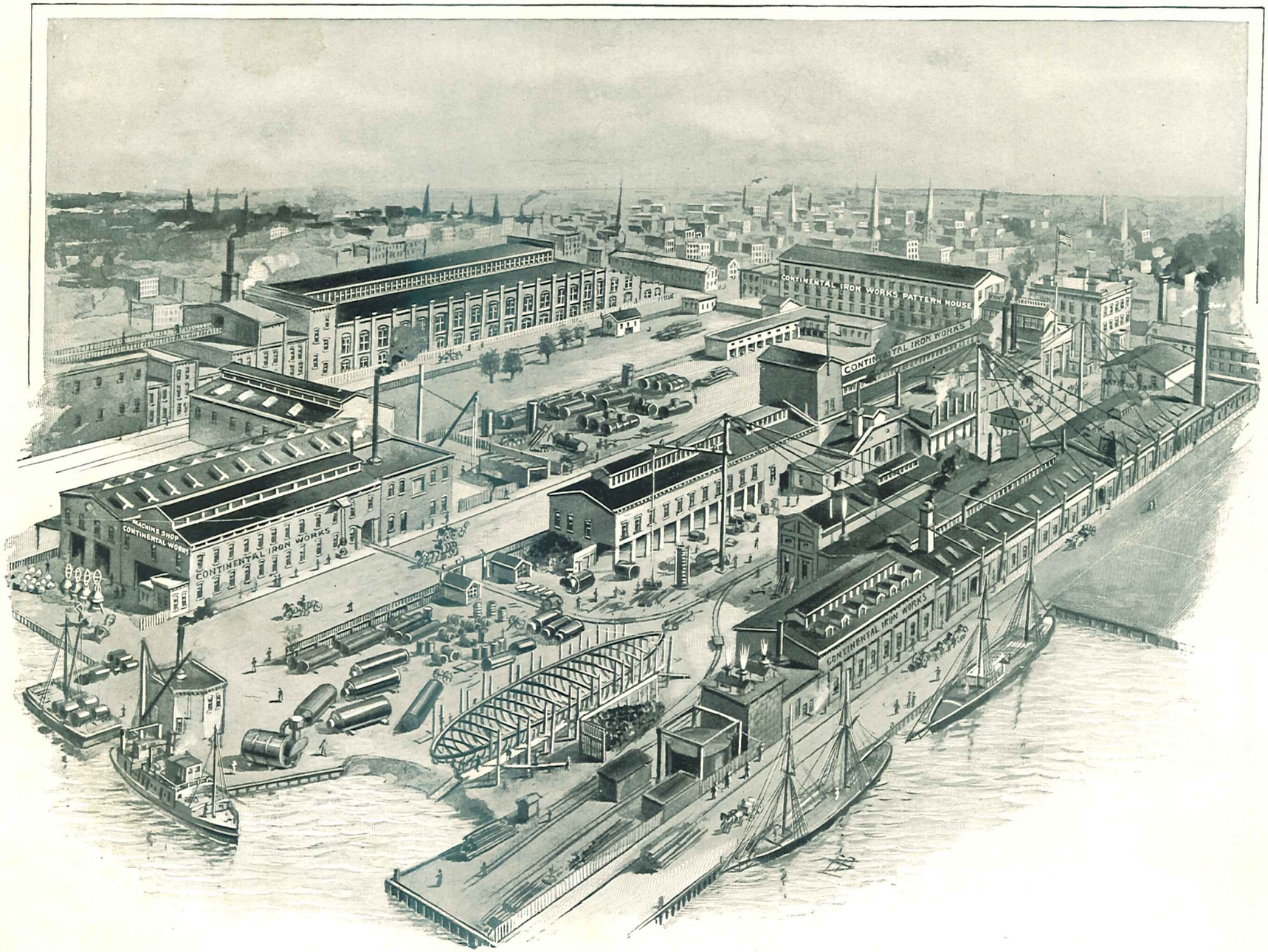
Morison Suspension Furnaces for Internal Furnace Boilers

1912

The Continental Iron Works
· New York ·
Borough of Brooklyn

REGISTERED BOOK

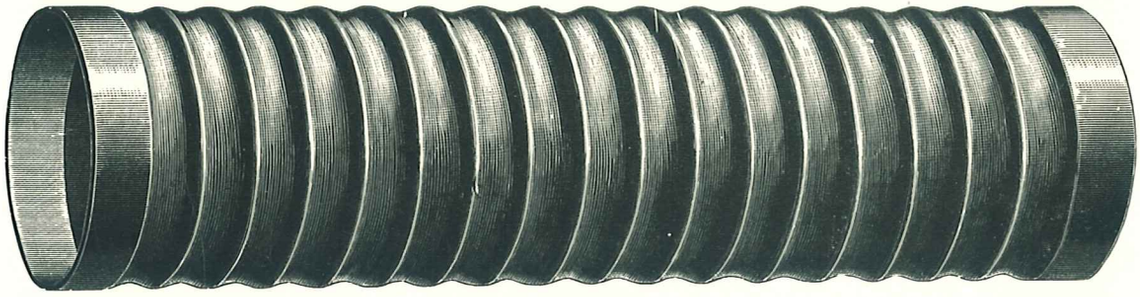
NO.



THE CONTINENTAL IRON WORKS, NEW YORK,

BOROUGH OF BROOKLYN.

MORISON SUSPENSION FURNACES



FURNACE FRONTS AND DOORS

FOR

INTERNAL FURNACE TUBULAR BOILERS.

MANUFACTURED IN THE

UNITED STATES OF AMERICA

SOLELY BY

THE CONTINENTAL IRON WORKS,

NEW YORK.

EIGHTH EDITION.

(BOROUGH OF BROOKLYN.)

1912

MORISON SUSPENSION FURNACES

FOR INTERNAL FURNACE TUBULAR BOILERS.

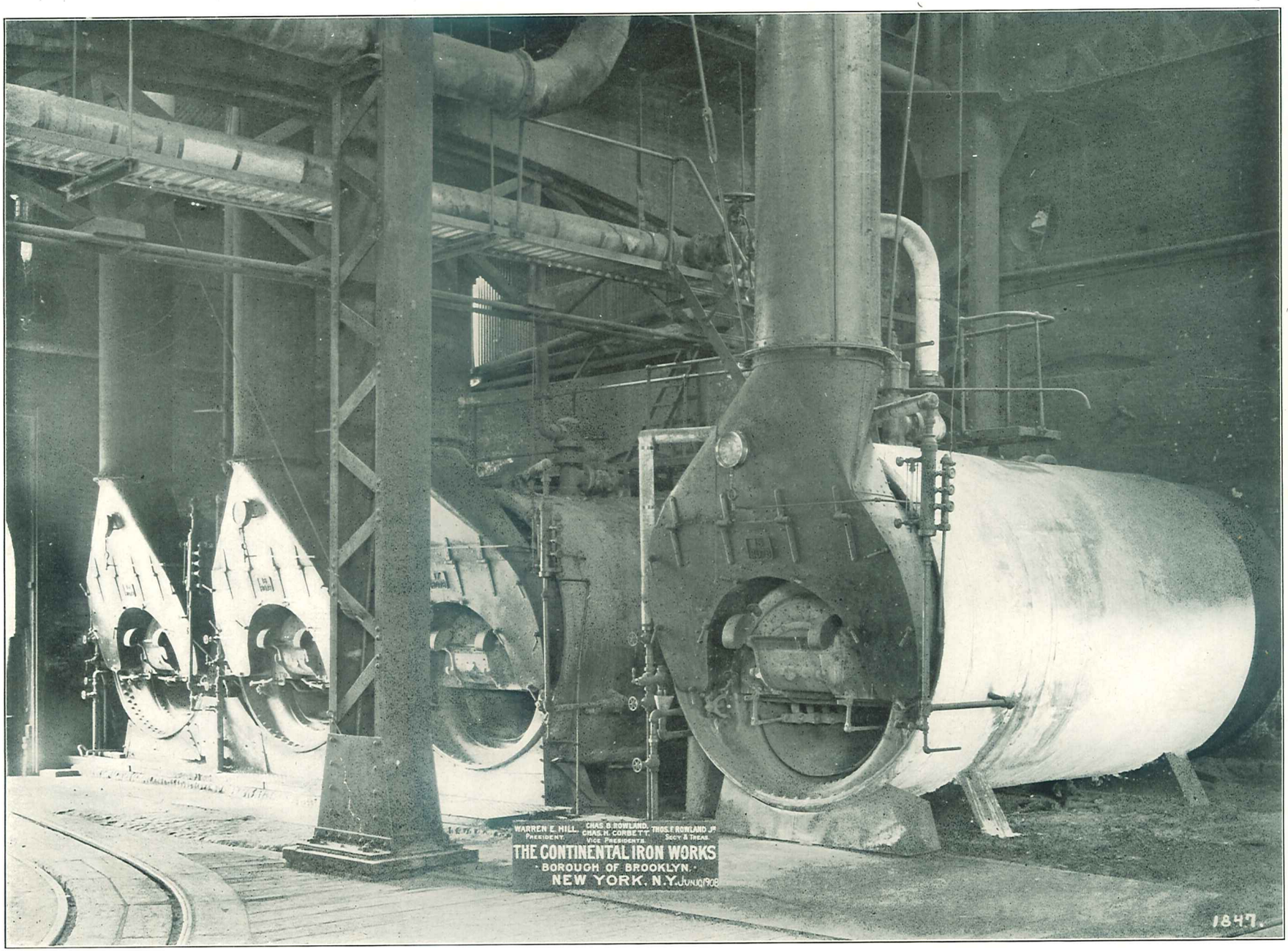
CONTENTS:

THE CONTINENTAL IRON WORKS,

NEW YORK.

(BOROUGH OF BROOKLYN.)

1912

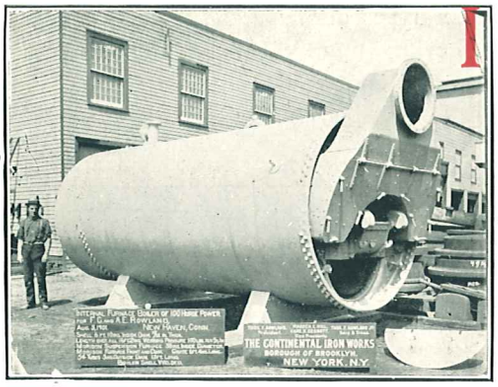


BATTERY OF INTERNAL FURNACE BOILERS AT THE CONTINENTAL IRON WORKS.

INTERNAL FURNACE TUBULAR BOILERS

WITH

MORISON SUSPENSION FURNACES.



IN presenting to the attention of Boiler Designers, Boiler Builders, and the Engineering Profession in general, the designs of **INTERNAL FURNACE TUBULAR BOILERS** contained in this book, it is the desire of **THE CONTINENTAL IRON WORKS** to call attention to the advantages to be derived from the adoption of boilers of this type for stationary purposes.

We do not maintain that the designs shown are suitable for every requirement where boilers of this type can be used, nor do we guarantee their performance, but their proportions are intended, as near as possible, to meet the general requirements of an economical steam generator working under ordinary conditions. Where boilers are to be operated under other than normal conditions, or to pass any particular specification, it is intended that the ideas set forth shall be utilized only as suggestions, by means of which boilers may be designed to meet the special requirements called for.

For Central Stations, generating electricity for either light or power, Water Works Pumping Stations, and all other Power or Heating Plants, it is very desirable that the most economical steam generator, as regards efficiency of operation and space occupied, shall be selected. The space devoted to the boilers in Public Buildings, Apartment Houses, Office Buildings, Hotels, etc., is usually in the cellar and generally of limited dimensions, necessitating the choice of a type of boiler which will admit of being installed and operated under these adverse conditions.

Formerly, where steam pressures not exceeding one hundred pounds per square inch were sufficient, the Horizontal Return Tubular Boiler, set in brick work, with its furnace grate beneath the shell, has been most in favor and generally adopted for stationary boiler service. The increasing demand for much higher steam pressures has, in later years, introduced other designs of steam generators, notably the various types of Water Tube Boilers, all of which are subject to the same character of defects as are incident to every type of boiler requiring a brick setting. These defects, which largely consist of the cracking of the walls of the setting, due to unequal heating and cooling, and the consequent expansion and contraction, permit great loss of heat by the infiltration of air through the interstices, which, together with the radiation from the mass of brick work, is a serious loss to effective boiler duty.

The volume of water contained in all Water Tube Boilers is relatively small, and necessarily affords but a limited reservoir for the storage of heat, the effect of which is frequent and rapid fluctuations in steam pressure, unless the "feeding" and the "firing" of the boiler are exceedingly regular.

INTERNAL FURNACE BOILERS contain relatively greater volumes of water, which act as reservoirs of heat, to be used as occasion demands, and aids in keeping the steam at constantly uniform pressures, which is a feature of vital importance.

In Water Tube Boilers where hard or dirty water is used for the feed, accumulations of scale and mud adhere to the inside surfaces of the headers and tubes, which it is practically impossible to remove, and the effect of which is to shorten the life of such boilers, eventually making them untrustworthy and probably dangerous.

Access to the interior of boilers of the INTERNAL FURNACE type is readily obtained by means of the several handholes and manholes; therefore, the removal of all deposits and accumulations of scale and mud is easily accomplished and the boiler given proper inspection and care.

In marine practice the "Scotch Boiler" has been found to fulfill all the severe requirements imposed upon it to an eminent degree, and it is to a similar type of **INTERNAL FURNACE BOILER,** slightly modified in its back connection, without detriment to its valuable features, to which it is desired to draw attention.

Referring to the drawings, it will be observed that the type of **INTERNAL FURNACE BOILER** presented, consists of a horizontal cylindrical shell, having a corrugated furnace, within the front portion of which the fire grate is located, the rear portion terminating in a back connection, or combustion chamber, consisting of a fire brick lined metallic casing, forming in effect, an extension of the boiler shell.

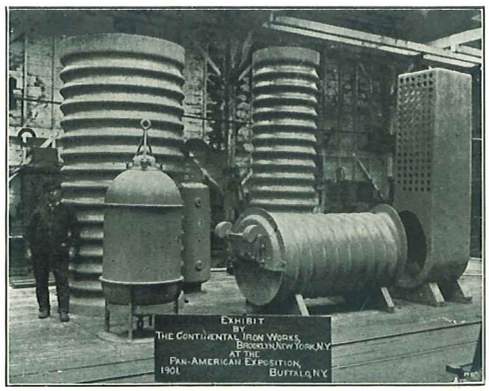
The products of combustion pass from this chamber through the horizontal tubes, and are delivered into a sheet iron breeching, attached to the front head of the boiler. This breeching may be connected directly with a smokestack, or, in the case of a battery of boilers, it may be attached to an uptake leading to a common chimney.

Several modifications of **INTERNAL FURNACE TUBULAR BOILERS** may be made. For example: Boilers may be arranged to contain two or more comparatively short furnaces, terminating in a common combustion chamber, from which tubes lead directly to a smoke connection at the rear of the boiler, without returning forward over the furnaces, thus forming the well-known "Gun Boat" or "Locomotive" type. Boilers of this latter type have been used in several Gun Boats and third-rate Cruisers of the United States Navy, also by numerous Water Works corporations, and have performed excellent service.

INTERNAL FURNACE BOILERS are admirably adapted to the use of oil fuel, inasmuch as the long CORRUGATED CYLINDRICAL FURNACES afford excellent combustion chambers for the thorough utilization of the high heat produced when liquid fuel is burned.

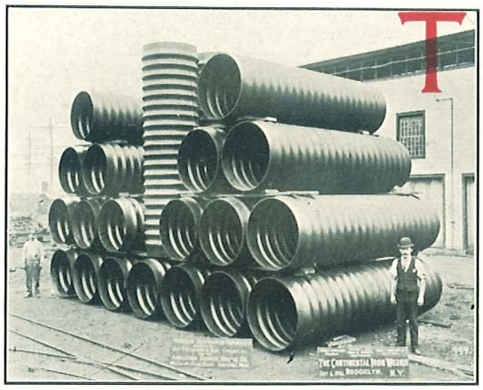
They are economical in first cost, because they are "self-contained"; that is, they are independent of masonry setting, cast iron front, buckstays, tie rods, etc., require but little foundation preparation, and are susceptible of being easily removed from one location to another with but slight expense.

They are also economical in the consumption of coal, from the fact that the furnaces and tubes, being surrounded by water, the heat of combustion is utilized to a greater extent than is practicable with boilers having external furnaces contained within brick wall settings.



VIEW AT THE CONTINENTAL IRON WORKS, NEW YORK, N. Y.

THE MORISON SUSPENSION FURNACE.



THE MORISON SUSPENSION FURNACE (designed and patented by Mr. Donald B. Morison, of West Hartlepool, England) is the result of a series of exhaustive experiments, which were conducted at Leeds, England, under the auspices of the late Mr. Samson Fox, the original introducer and promoter of the world renowned FOX CORRUGATED FURNACE.

The advent of THE FOX CORRUGATED FURNACE materially advanced the standard of boiler design and construction, and early commanded the highest consideration of all boiler designers, builders and users, readily maintaining its distinction until the appearance of THE MORISON SUSPENSION FURNACE, which at once assumed equal rank with it. These two designs still stand unrivaled, notwithstanding the fact that numerous attempts have been made to produce a boiler furnace which would compete with and share in their established reputation.

THE MORISON SUSPENSION FURNACE inherits, in pronounced development, all the well known and valuable features of THE FOX CORRUGATED FURNACE. The catenary form of curve, the distance between the centres of the ridges, together with the general proportions, as finally adopted, were experimentally and practically determined, and have been proved to offer the greatest resistance to distortion or collapse, while presenting a heating surface which offers the minimum facility for lodgment of scale, with the maximum convenience for readily removing the same when formed.

These marked advantages of the MORISON SUSPENSION FURNACE have been fully recognized, and as a result, it has been accepted and properly classified by the Board of U. S. Supervising Inspectors of Steam Vessels, the English Admiralty, Lloyd's, Board of Trade, Bureau Veritas, etc., etc.

THE MORISON SUSPENSION FURNACE is free from liability to crack and become distorted, accidents so incident to any type of furnace which is reinforced with thick ribs rolled thereon. It is also free from leakage, incident to all types of furnaces which consist of sectional flanged and riveted cylinders, with reinforcing rings interposed between the flanges.

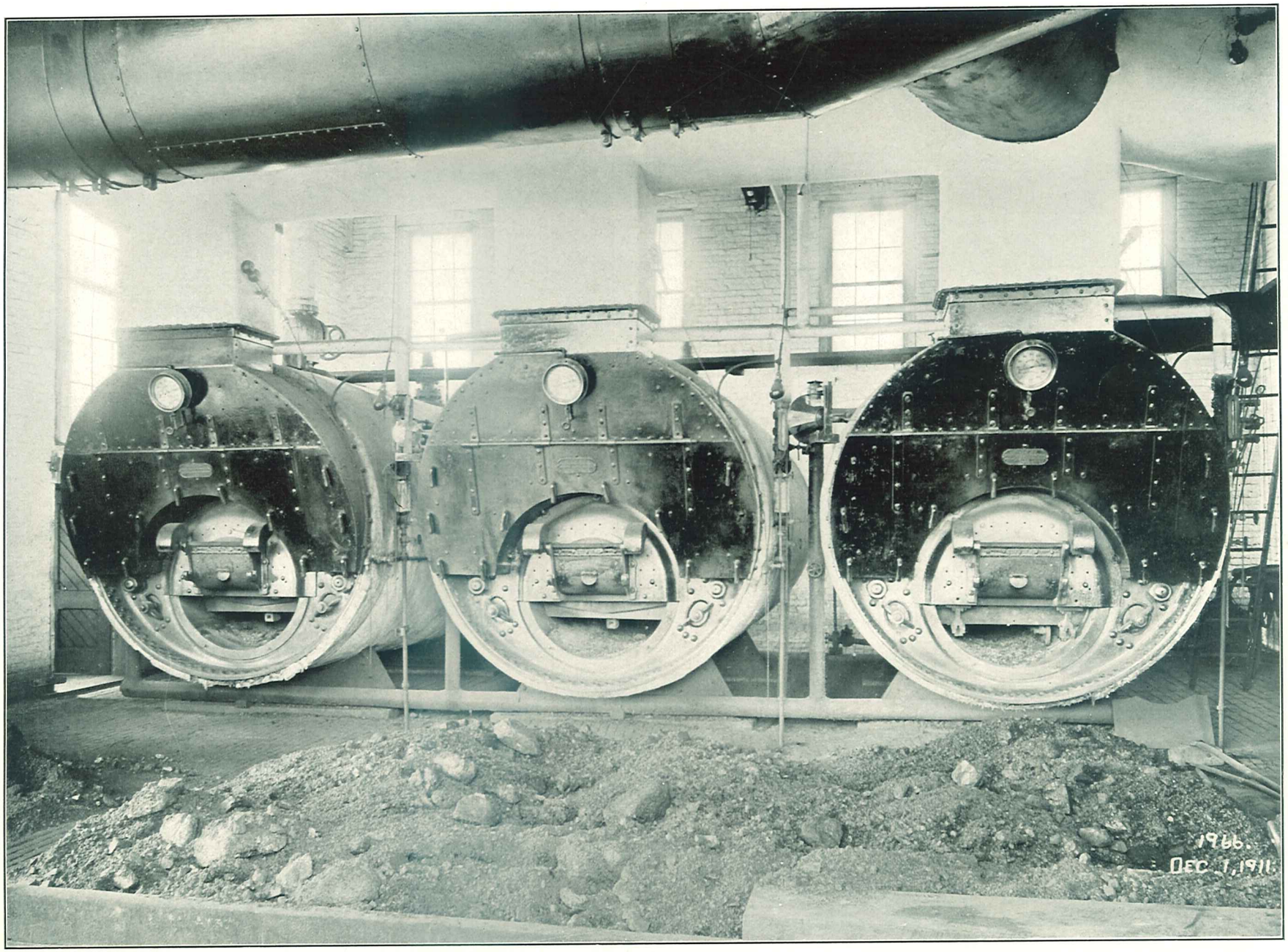
The freedom of THE MORISON SUSPENSION FURNACE from these adverse and destructive features has caused its adoption in numerous instances, to replace derelict furnaces of other designs.

Official tests made on MORISON SUSPENSION FURNACES by the Board of U. S. Supervising Inspectors of Steam Vessels, during the month of February, 1906, so clearly demonstrated their superiority to withstand collapsing pressure that the Board now allows a Constant of 15,600 in the formula for calculating the thickness of metal required in MORISON SUSPENSION FURNACES, for a given diameter and steam pressure.

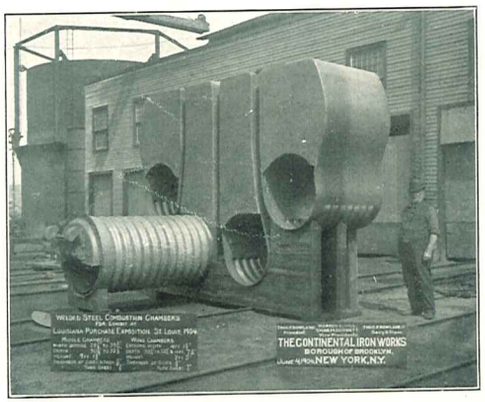
MORISON SUSPENSION FURNACES are made of the very best quality of steel plate, of specified chemical and physical characteristics, which, together with the first-class workmanship necessarily required for their production, insures perfection in the completed product.

MORISON SUSPENSION FURNACES, also FOX CORRUGATED FURNACES, are manufactured solely in the United States of America by THE CONTINENTAL IRON WORKS, NEW YORK, BOROUGH OF BROOKLYN.

In addition to the manufacture of the two types of Corrugated Furnace mentioned above, THE CONTINENTAL IRON WORKS make a specialty of producing various articles of more or less intricate design, by welding steel plates, such as WELDED STEEL DIGESTERS, GAS RECEIVERS, STEAM AND HYDRAULIC PIPES, GAS BUOYS, BACK CONNECTIONS FOR MARINE BOILERS, ETC., ETC. While this book is intended primarily to illustrate the application of CORRUGATED FURNACES TO INTERNAL FURNACE BOILERS, it also calls attention to the other specialties by means of the small illustrations shown.



BOILER PLANT, NEW HAVEN WATER CO., NEW HAVEN, CONN., SALTONSTALL LAKE STATION.

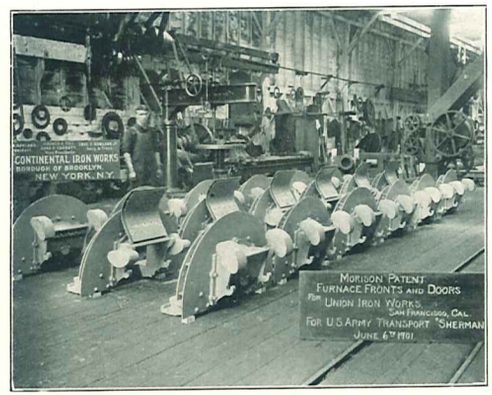


Welded Combustion Chambers.

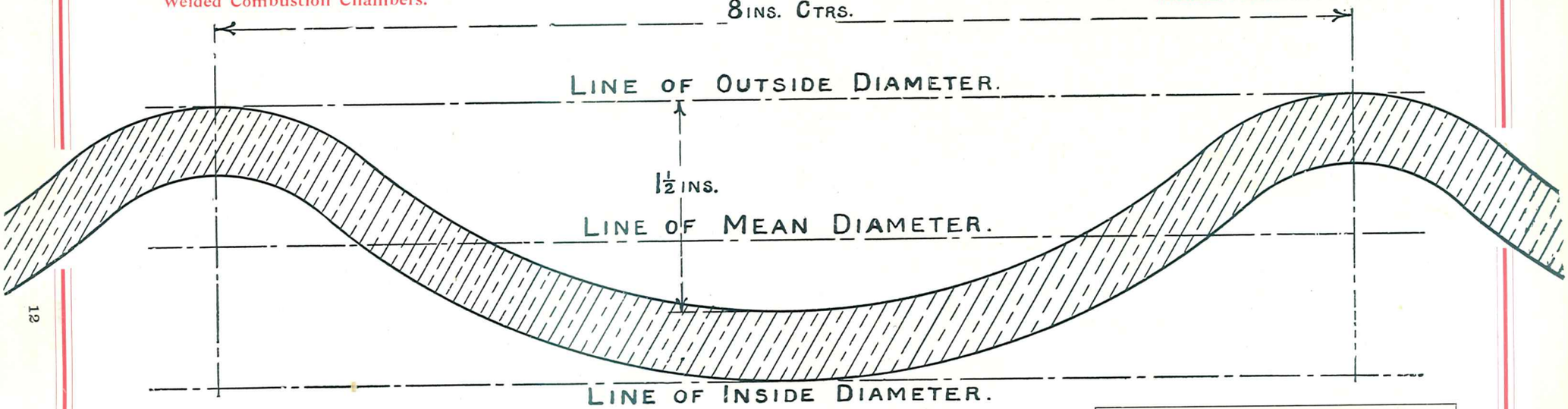
FULL SIZE DETAIL

OF

CORRUGATION.



Morison Fronts and Doors.



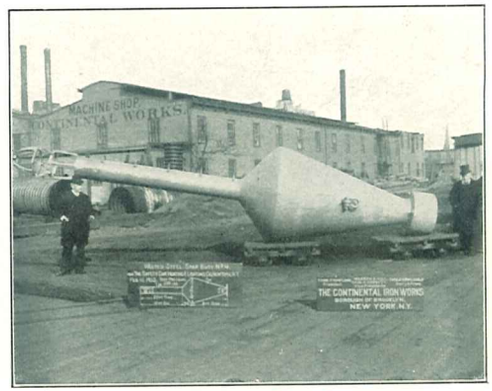
MORISON SUSPENSION FURNACES.

MANUFACTURED BY

THE CONTINENTAL IRON WORKS,

NEW YORK.

(BOROUGH OF BROOKLYN.)



Welded Spar Gas Buoy.


MORISON SUSPENSION FURNACES
FOR STEAMERS
"SOLANO" "BAY CITY" AND "GARDEN CITY"
ORDERED BY CARBON STEEL CO. NEW YORK, N.Y.
24 FURNACES.
INSIDE DIAM. 4 FT. 0 IN.
LENGTH 13 - 3 INS.
THICKNESS 7/16 IN.
6 FURNACES.
INSIDE DIAM. 4 FT. 6 INS.
LENGTH 17 - 3 INS.
THICKNESS 11/16 IN.
THOS. F. ROWLAND, President.
WARREN E. HILL, CHAS. H. DORBETT, Vice Presidents.
THOS. F. ROWLAND JR. Secy. & Treas.
THE CONTINENTAL IRON WORKS
BOROUGH OF BROOKLYN.
MAY 26, 1904. NEW YORK, N.Y.

BOILER PLANT, NEWBURGH BLEACHERY, NEWBURGH N. Y.

The Following Rule for Calculating the Thickness of Metal for Morison Suspension Furnaces,

when the inside diameters and working pressures are known, is that adopted by the Board of U. S. Supervising Inspectors of Steam Vessels, and in effect since Feb. 28th, 1906, corrugations to be 8 inches pitch and 1½ inches deep; the plain parts at ends not to exceed 9 inches in length.

$$T = \frac{P \times D}{15{,}600}$$

T = Thickness of Furnace in inches.
P = Working pressure in pounds per square inch.
D = Mean diameter of Furnace in inches = inside diameter in inches + 2.
15,600 = a Constant.

EXAMPLE:—Given a Furnace 40 inches mean diameter, to carry 195 lbs. working pressure, required the thickness of metal:

$$T = \frac{195 \times 40}{15{,}600} = \frac{1}{2} \text{ inch.}$$

EXAMPLE:—Given a Furnace 40 inches mean diameter, ½ inch thick, required the pressure allowed:—

By transposing the above rule, we have

$$P = \frac{15{,}600}{D} \times T. \quad \text{Hence, } P = \frac{15{,}600}{40} \times \frac{1}{2} = 195 \text{ pounds.}$$

NOTE.—The plain parts at the ends of Furnaces referred to above, are measured as indicated on the following sketch.

A—Centre line of rivets.
B—Tangent point of curve.

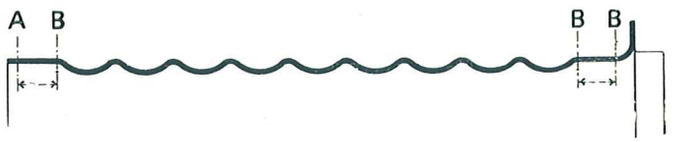
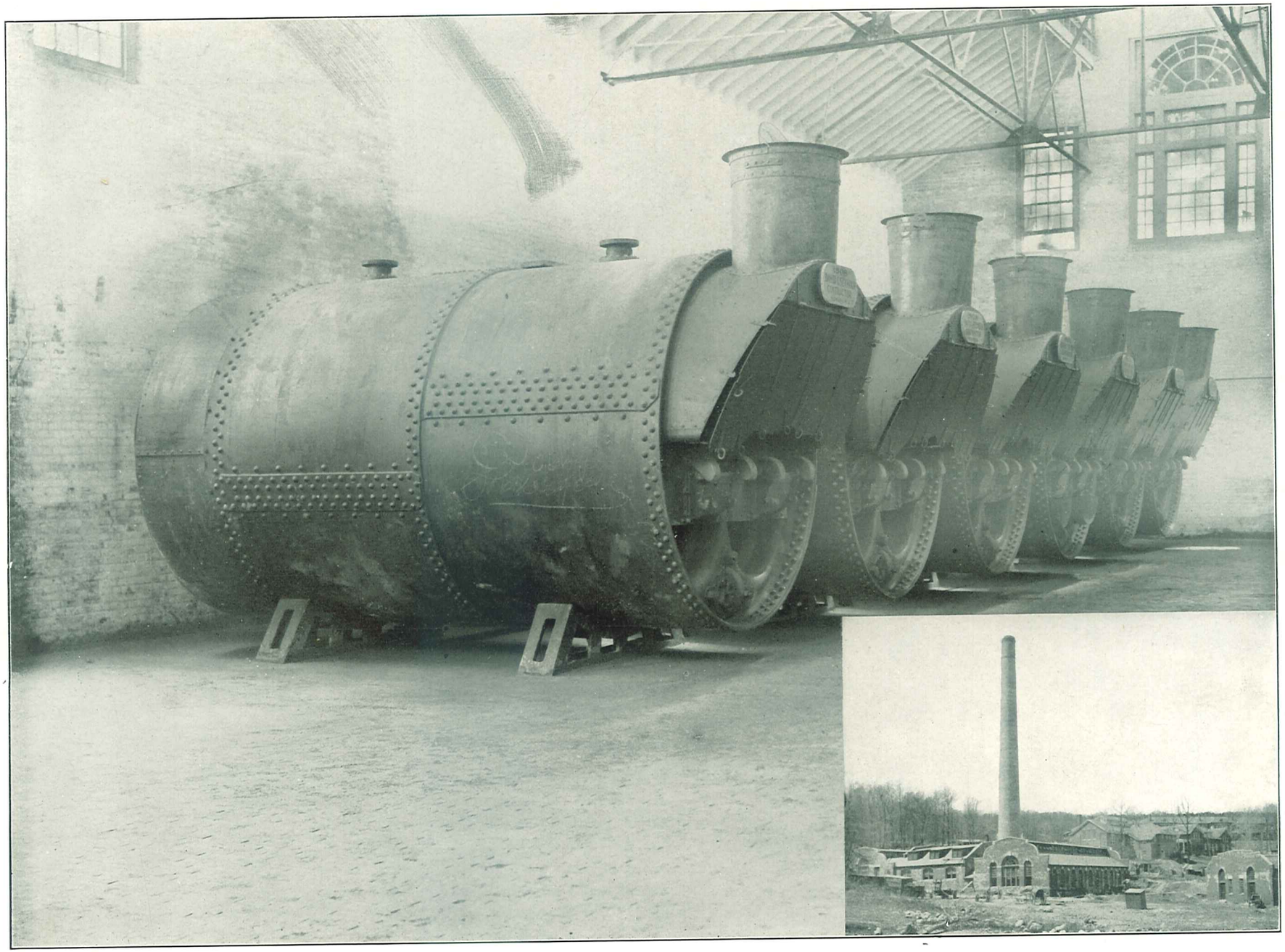


Table Showing Working Pressure and Thickness of Morison Suspension Furnaces.

Inside Diameter of Furnace in Inches.	THICKNESS OF FURNACE IN INCHES.														
	5/16 in.	11/32 in.	3/8 in.	13/32 in.	7/16 in.	15/32 in.	1/2 in.	17/32 in.	9/16 in.	19/32 in.	5/8 in.	21/32 in.	11/16 in.	23/32 in.	3/4 in.
	WORKING PRESSURE IN POUNDS PER SQUARE INCH.														
28 ins.	162	178	195	211	227	243	260	276	292	308	325	341	357	373	390
29	157	172	188	204	220	235	251	267	283	298	314	330	345	361	377
30	152	167	182	198	213	228	243	258	274	289	304	319	335	350	365
31	147	162	177	192	206	221	236	251	265	280	295	310	325	339	354
32	143	157	172	186	200	215	229	243	258	272	286	301	315	329	344
33	139	153	167	181	195	208	222	236	250	264	278	292	306	320	334
34	135	148	162	176	189	203	216	230	243	257	270	284	297	311	325
35	131	144	158	171	184	197	210	223	237	250	263	276	289	303	316
36	128	141	153	166	179	192	205	218	230	243	256	269	282	295	307
37	125	137	150	162	175	187	200	212	225	237	250	262	275	287	300
38	121	134	146	158	170	182	195	207	219	231	243	255	268	280	292
39	118	130	142	154	166	178	190	202	214	225	237	249	261	273	285
40	116	127	139	150	162	174	185	197	208	220	232	243	255	266	278
41	113	124	136	147	158	170	181	192	204	215	226	238	249	260	272
42	110	121	132	144	155	166	177	188	199	210	221	232	243	254	265
43	108	119	130	140	151	162	173	184	195	205	216	227	238	249	260
44	105	116	127	137	148	158	169	180	190	201	211	222	233	243	254
45	103	114	124	134	145	155	165	176	186	197	207	217	228	238	248
46	101	111	121	132	142	152	162	172	182	192	203	213	223	233	243
47	99	109	119	129	139	149	159	169	179	189	198	208	218	228	238
48	97	107	117	126	136	146	156	165	175	185	195	204	214	224	234
49	95	105	114	124	133	143	152	162	172	181	191	200	210	219	229
50	93	103	112	121	131	140	150	159	168	178	187	196	206	215	225
51	91	101	110	119	128	137	147	156	165	174	183	193	202	211	220
52	90	99	108	117	126	135	144	153	162	171	180	189	198	207	216
53	88	97	106	115	124	132	141	150	159	168	177	186	195	203	212
54	87	95	104	113	121	130	139	147	156	165	174	182	191	200	208
55	85	94	102	111	119	128	136	145	153	162	171	179	188	196	205
56	84	92	100	109	117	126	134	142	151	159	168	176	184	193	201
57	82	90	99	107	115	123	132	140	148	156	165	173	181	190	198
58	81	89	97	105	113	121	130	138	146	154	162	170	178	186	195
59	79	87	95	103	111	119	127	135	143	151	159	167	175	183	191
60	78	86	94	102	110	117	125	133	141	149	157	165	172	180	188

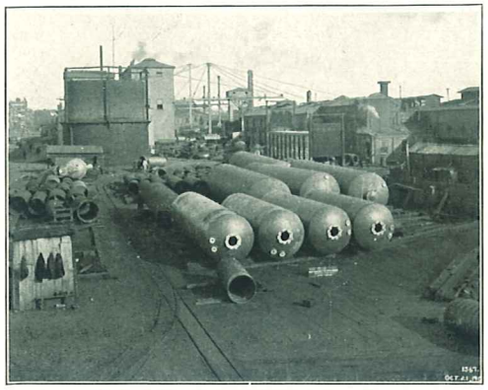


BOILER PLANT, ESSEX COUNTY ASYLUM, OVERBROOK, N. J.

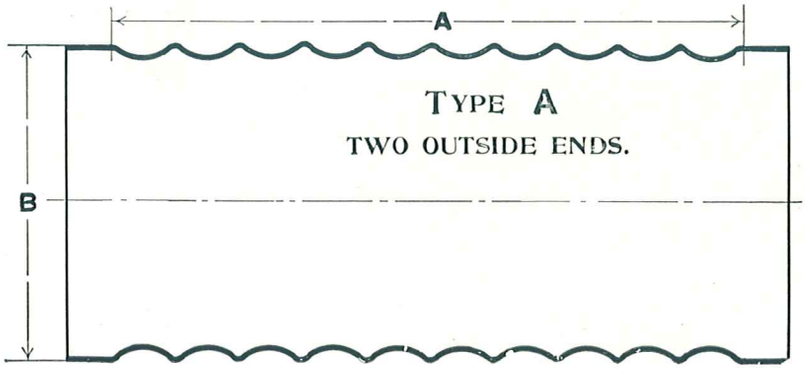
MORISON SUSPENSION FURNACES

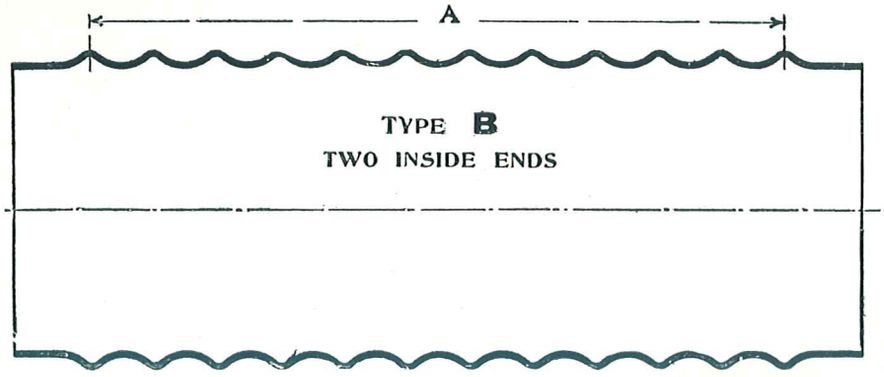
WITH

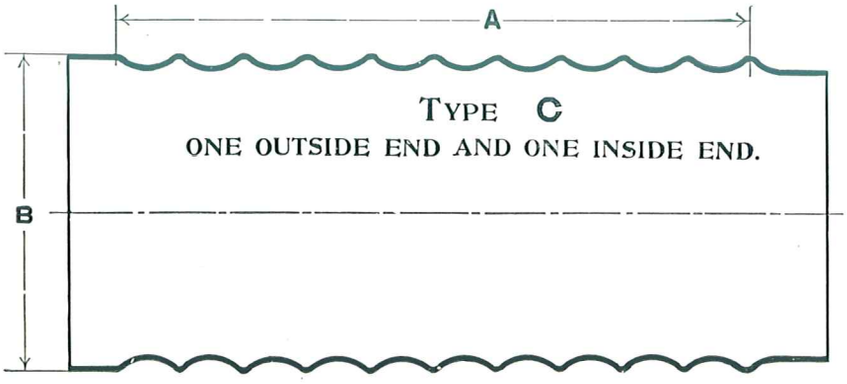
Plain Ends.

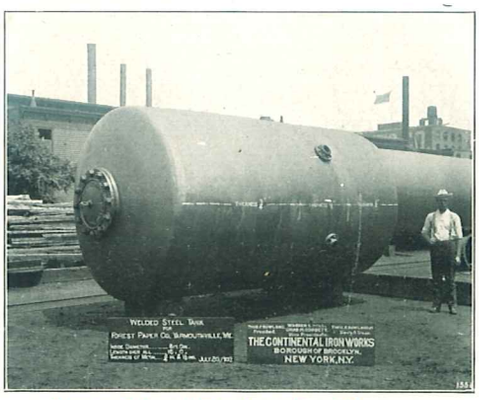


Welded Steel Digesters, Etc.









Welded Steel Tank, 8 Ft. Diameter.

MANUFACTURED BY

THE CONTINENTAL IRON WORKS,

NEW YORK.

(BOROUGH OF BROOKLYN.)

NOTES.

Welded Steel Annealing Pots.

IN designing **INTERNAL FURNACE BOILERS WITH MORISON SUSPENSION FURNACES,** be sure that Dimension A, in inches, Types A, B and C, page 17, representing the distance between the extreme corrugations, is divisible by 8.

The reason for so doing is the fact that the Suspension Curves are spaced 8 inches from center to center.

DIMENSION B, IN TYPES A AND C, representing the outside diameter of the front end of furnace, should be at least $\frac{1}{4}$ of an inch greater than the outside diameter of the body of the furnace.

This allows the furnace to be readily passed through the flanged opening in the front head of the boiler.

HAVE PLENTY OF ROOM between the tubes and the furnace; also the tubes and the shell, and between the bottom of the furnace and shell. This is necessary, that the circulation of the water may be uninterrupted. We advise that none of these spaces be less than 3 inches.

WHEN INQUIRING FOR QUOTATIONS, on MORISON SUSPENSION FURNACES, be particular to furnish the following data, viz.: Inside diameter, and total length of furnaces; also steam pressure to be carried, or the thickness of the furnaces, as determined from the table on page 15.

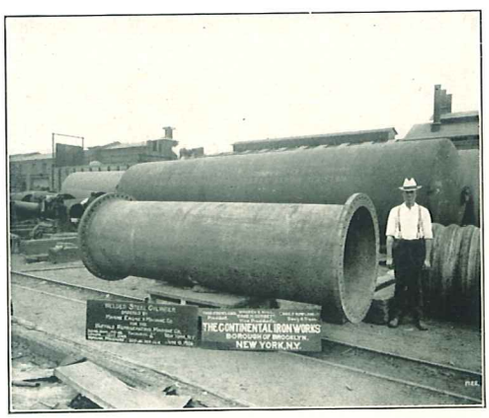
ESTIMATES FURNISHED ON APPLICATION for any size Morison Suspension Furnace, from 28 inches inside diameter, any thickness from $\frac{5}{16}$ to $\frac{3}{4}$ of an inch, and of any length. All quotations are for delivery F. O. B. New York.

WHEN ORDERING MORISON SUSPENSION FURNACES, to avoid confusion, it is better to send a sketch of the furnaces required, with figures giving the inside diameter, length over all, length of plain part at each end, outside diameter at each end, thickness of metal or the pressure to be carried.

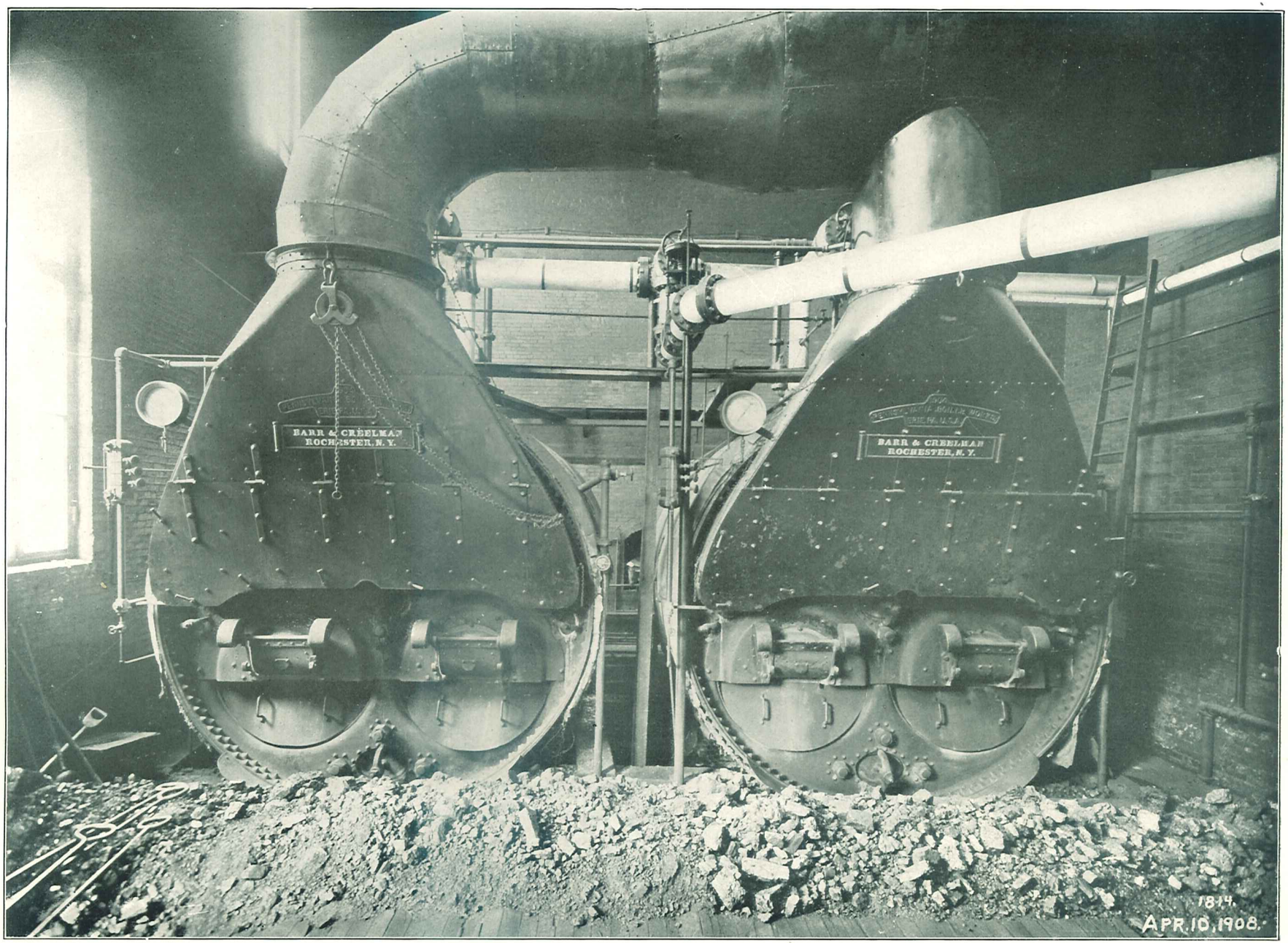
It is necessary to note that furnaces will be practically cylindrical, and formed **TO THE DIMENSIONS FURNISHED,** so all allowances of whatever nature must be made by the party ordering them.

In the event of information being desired in reference to **FURNACES WITH FLANGED ENDS,** please send for our book on MORISON SUSPENSION FURNACES FOR MARINE BOILERS.

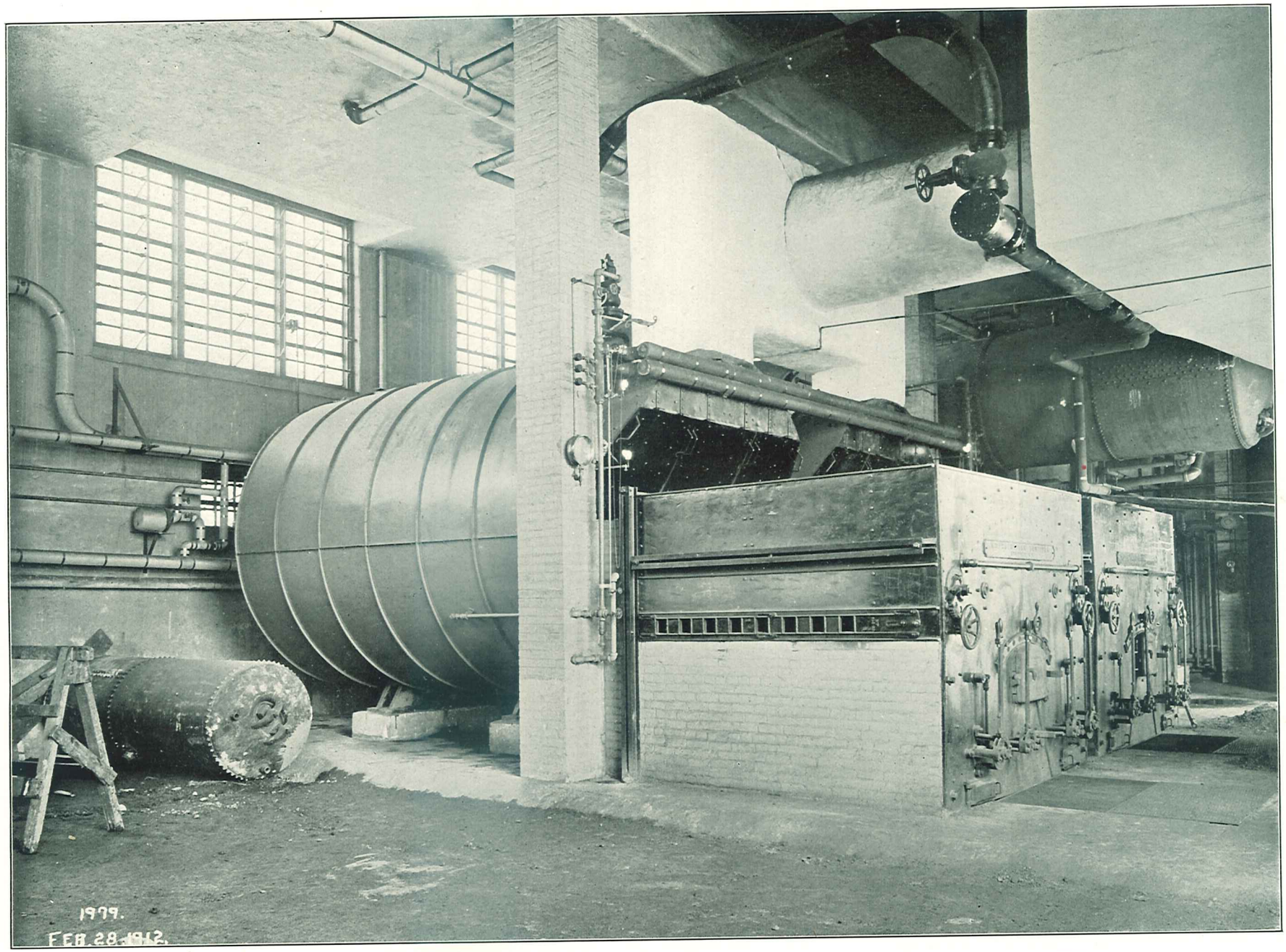
FURNACE FITTINGS. It is desirable that the bridge wall and grate bearer bar be so arranged in the furnace, that it is not necessary to attach them thereto by bolts or rivets, thus providing against the possible occurrence of leaks, and, at the same time, permit of any possible slight change in position which may occur, due to difference in temperature, etc. We therefore submit the design shown in Drawing No. 15, Figure No. 3, as an arrangement of these parts which has given general satisfaction.



Welded Steel Pipe.



BOILER ROOM, PUMPING STATION, ROCHESTER WATER WORKS, ROCHESTER, N. Y.



BOILERS AT METROPOLITAN HOSPITAL, BLACKWELLS ISLAND, NEW YORK CITY.
EQUIPPED WITH DUTCH OVEN FURNACES.

BAFFLE ARCH. In all boilers of the INTERNAL FURNACE type, it is desirable to place a ring of fire brick at the extreme rear end of the Corrugated Furnace, to cover and protect the rivets and the double thickness of metal at this point.

Instead of leaving the opening through this ring circular, it is well to close a portion of the upper part of it, as shown by Figure 1, Sheet of Details, Drawing 15, for the reason that the heat of combustion is then deflected toward the bottom of the furnace, which has the tendency to increase the temperature of the water at this point, thereby materially increasing its circulation. This arrangement is technically known as a BAFFLE ARCH, and the table shown on Drawing 15 gives the necessary dimensions for its construction, to suit the Corrugated Furnaces used in the various boiler designs illustrated in this book.

LIQUID FUEL. The demand for boilers adapted to burn liquid fuel is met in an eminent degree by THE INTERNAL FURNACE BOILER, illustrated in this book.

The comparatively long furnaces afford excellent combustion space, the corrugations of which act as "baffles" to thoroughly mix the oil vapor and the steam or air, whichever is employed, to atomize the oil.

In consequence of the intense local heat, produced when oil is burned, it is advisable to line the front portion of the furnace throughout its entire circumference with refractory material, say about 4 inches thick. This does not materially detract from the steam producing capacity of this portion of the furnace, but preserves it from overheating at the point of most intense combustion.

AUTOMATIC STOKER. It is frequently desirable to install some form of automatic stoker in connection with INTERNAL FURNACE BOILERS, and this can be readily done, as is shown by the photograph on Page No. 23, which shows a battery of boilers fitted with under-feed stokers.

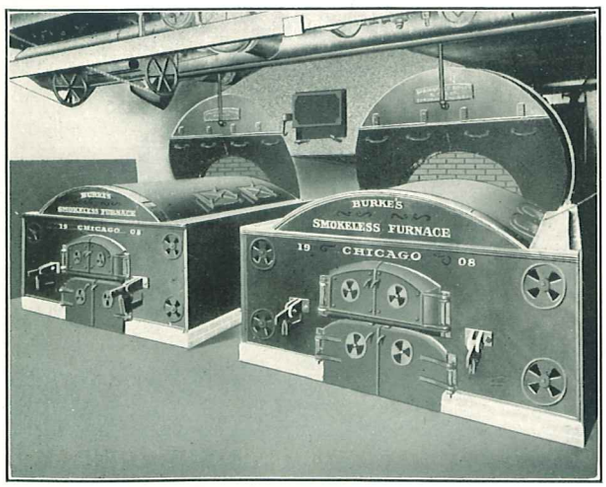
In the case of double furnace boilers, the stokers may interfere with free entrance to the boiler through the lower manhole in the front head, in which case this manhole may be located in the rear head of the boiler, and access afforded to it by means illustrated in Drawing No. 15, Figure No. 2.

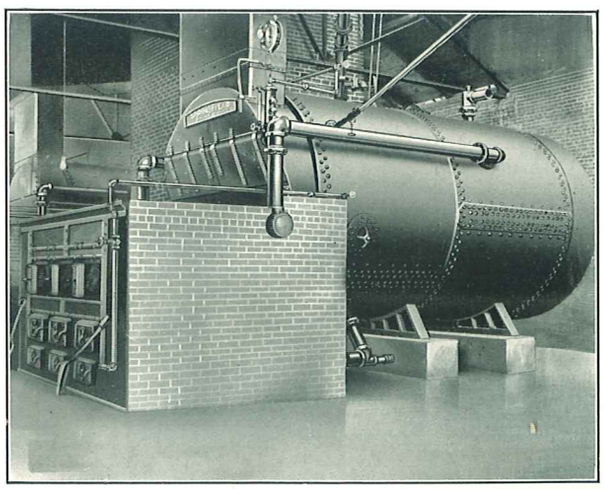
DUTCH OVEN FURNACES. The INTERNAL FURNACE BOILER, with MORISON SUSPENSION FURNACE, is particularly adaptable where it is desirable to burn the fuel in exterior furnaces of the Dutch Oven type, such as the Hawley Downdraft or Burke Furnaces, etc. Excellent results, by this combination, are obtained in the economy of operation, freedom from smoke, etc.

The picture on the opposite page shows a battery of INTERNAL FURNACE BOILERS of 200 H. P. each, equipped with exterior Magazine Dutch Oven Furnaces.

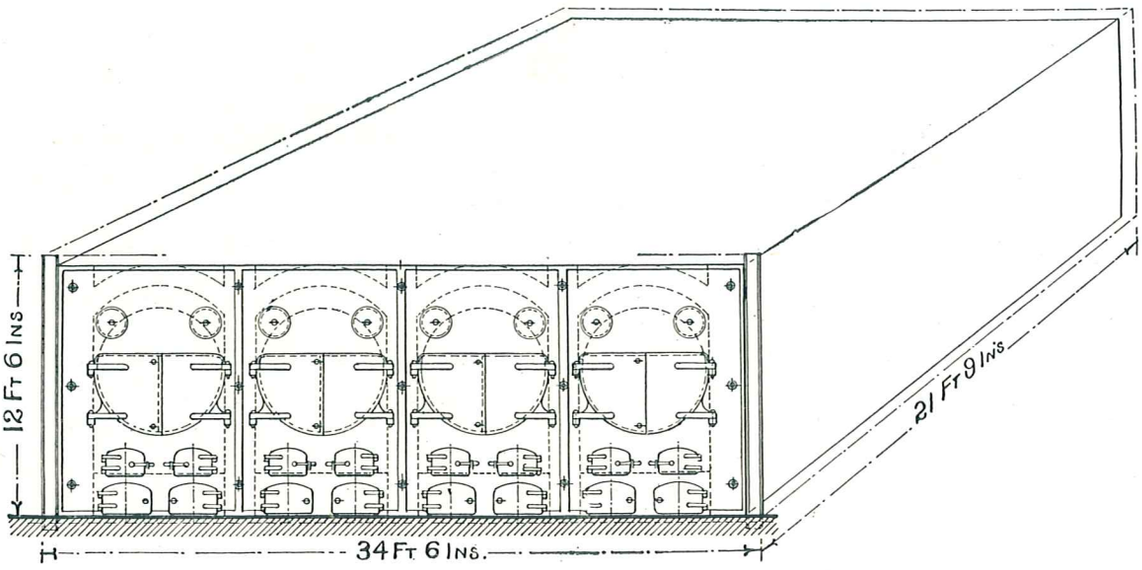
The pictures at the bottom of this page show two boiler installations; one equipped with the Burke Smokeless Furnace and the other with the Hawley Downdraft Furnace.

SHIPMENTS. All orders for furnaces are accepted for delivery F. O. B. New York. Our customers are requested to furnish full shipping instructions with each order, otherwise we will use our judgment and make shipment by what appears to us to be the most economical route.





Comparative Floor Area and Cubic Feet of Space Occupied by a Battery of Boilers of 500 Horse Power of the Internal Furnace and Horizontal Tubular Types.

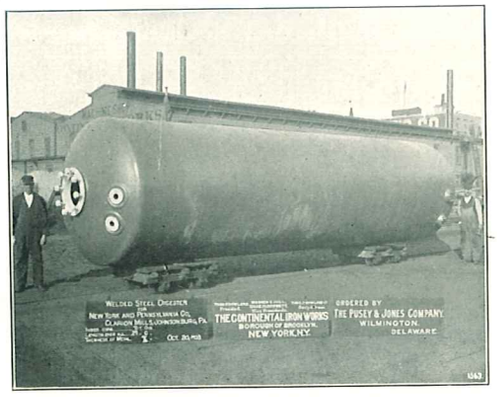


HORIZONTAL TUBULAR BOILER, SET IN BRICK WORK, 500 H. P.

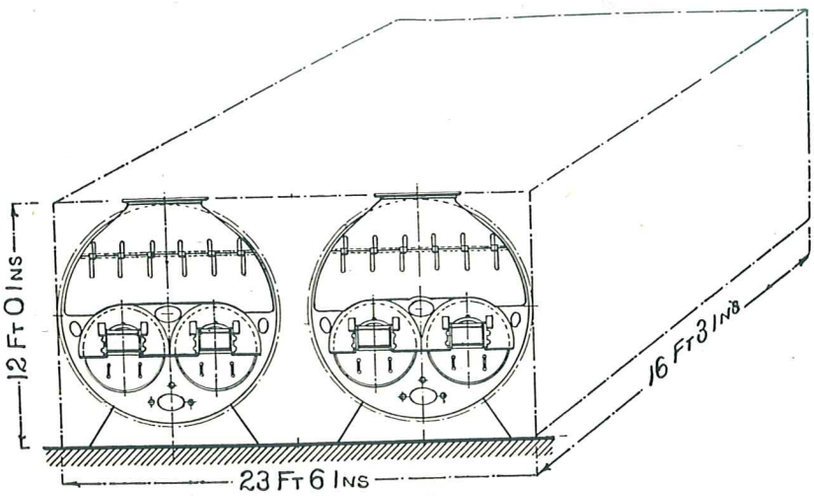
34 feet 6 inches x 21 feet 9 inches x 12 feet 6 inches equals 9379.687 Cubic Feet of Space Occupied.
34 feet 6 inches x 21 feet 9 inches equals 750.375 Square Feet of Floor Occupied.

INTERNAL FURNACE BOILERS, 500 H. P.

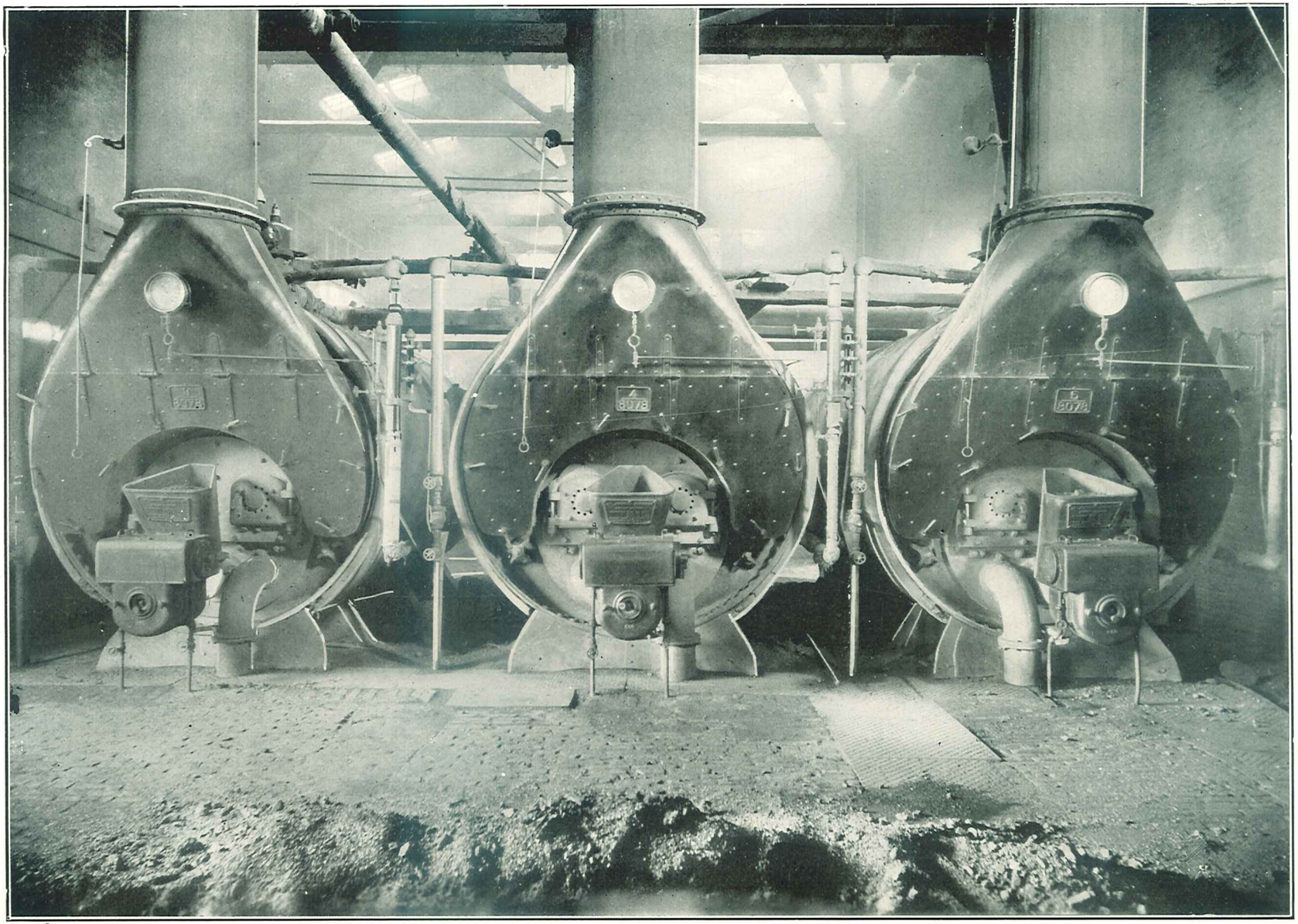
23 feet 6 inches x 16 feet 3 inches x 12 feet 0 inches equals 4582.500 Cubic Feet of Space Occupied.
23 feet 6 inches x 16 feet 3 inches equals 381.875 Square Feet of Floor Occupied.



Welded Digester, 7 Feet Diameter.



Showing that the INTERNAL FURNACE BOILERS Require Less Than 51% of the Floor Area, and Less Than 50% of the Cubic Feet of Space Occupied by the HORIZONTAL TUBULAR BOILERS, Set in Masonry.



INTERNAL FURNACE BOILERS FITTED WITH UNDERFEED STOKERS.

RATING THE POWER OF BOILERS.

The term HORSE POWER, as used in relation to steam boilers, is the capacity to evaporate 30 pounds of water per hour from a temperature of 100° Fahrenheit into steam at 70 pounds gauge pressure, or 34½ pounds of water evaporated per hour, from a feed water temperature of 212° F. into steam at atmospheric pressure. This unit of power is the one adopted by the American Society of Mechanical Engineers and generally accepted as a standard.

In many tests made upon boilers of the INTERNAL FURNACE TYPE they have evaporated 10 pounds of water per pound of coal burned per hour. In designing the INTERNAL FURNACE BOILERS illustrated in this book, an evaporation of 10 pounds of water per pound of coal, having 10% ash, burned, and a consumption of 18 pounds of coal per square foot of grate per hour, have been used as a basis. With the above data a simple calculation shows that these boilers should produce 5 BOILER HORSE POWER per square foot of grate.

In order to better utilize the long-flamed bituminous coal used in some localities, and also to afford a longer run of flame where oil is used as a fuel, two sets of designs of boilers, known respectively as type "A" and type "B," have been prepared.

The type "B" design of boiler being somewhat less in diameter and also longer than the type "A" design, it is believed will meet with favor among engineers, on account of its increased ratio of heating surface to grate surface.

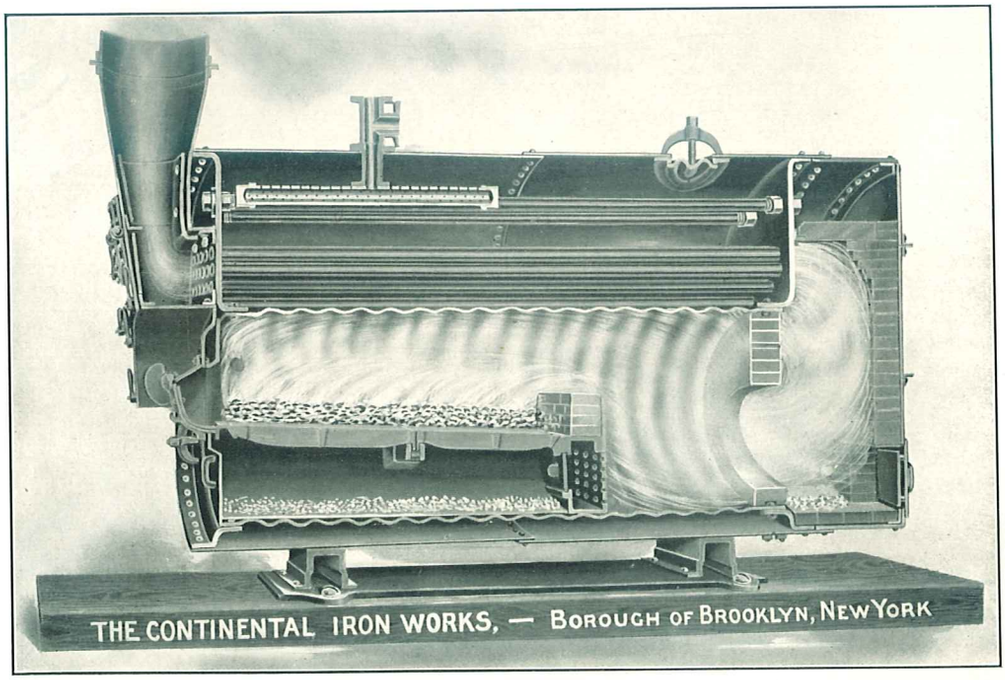
The following tables give the general proportions and sizes upon which the various designs have been carried out.

General Proportions of Type "A" Boilers Ranging from 50 to 300 Horse Power.

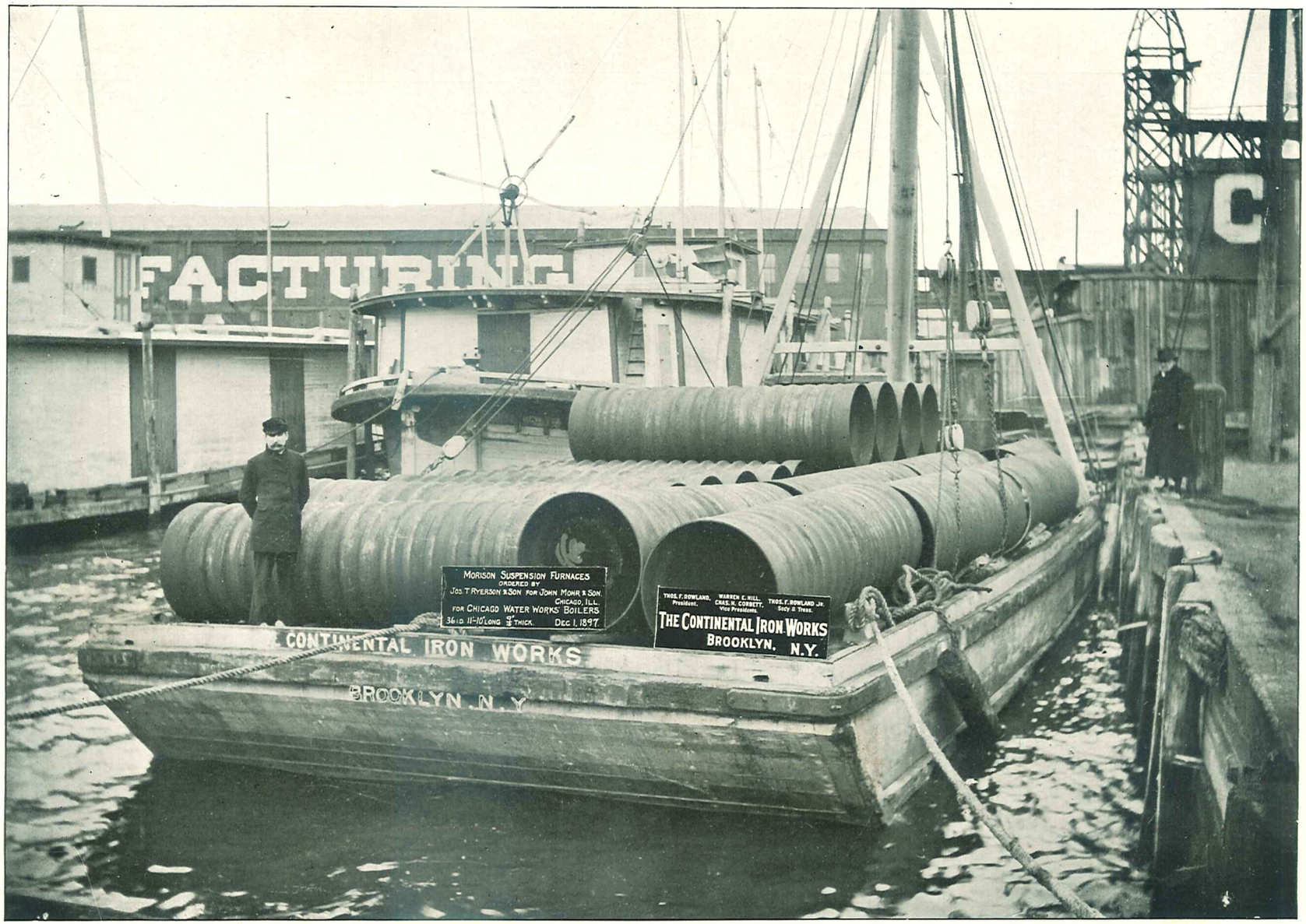
Rated Horse Power	50	75	100	125	150	200	250	300
Grate Surface in square feet	12	15	20	25	30	40	50	60
Heating Surface in square feet	423	527	733	905	1071	1423	1780	2157
Ratio of H. S. to G. S.	35.2 to 1	35.2 to 1	36.6 to 1	36.2 to 1	35.7 to 1	35.6 to 1	35.6 to 1	35.9 to 1
Diameter of Tubes	3ins.	3½ins.	3½ins.	3½ins.	3½ins.	3½ins.	3½ins.	3½ins.
Number of Tubes	48	42	56	70	80	108	137	161
Length of Tubes	9ft. 6ins.	11ft. 6ins.	12ft. 6ins.	12ft. 6ins.	13ft. 0ins.	12ft. 6ins.	12ft. 6ins.	13ft. 0ins.
Area through Tubes in square feet	2.02	2.44	3.25	4.06	4.64	6.26	7.95	9.34
Ratio Area through Tubes to Grate Surface	1 to 5.94	1 to 6.15	1 to 6.15	1 to 6.15	1 to 6.46	1 to 6.39	1 to 6 29	1 to 6.42
Inside Diameter of Boiler Shell	6ft. 3ins.	6ft. 6ins.	7ft. 0ins.	7ft. 6ins.	8ft 0ins.	9ft. 6ins.	10ft. 6ins.	11ft. 6ins.
Inside Diameter of Corrugated Furnace	36ins.	36ins.	38ins.	45ins.	50ins.	38ins.	45ins.	50ins.
Length of Grate	4ft. 0ins.	5ft. 0ins.	6ft. 4ins.	6ft. 8ins.	7ft. 3ins.	6ft. 4ins.	6ft. 8ins.	7ft. 3ins.
Depth of Combustion Chamber	2ft. 0ins.	2ft. 0ins.	2ft. 6ins.	2ft. 6ins.	2ft. 6ins.	2ft. 6ins.	2ft. 6ins.	2ft. 6ins.
Estimated Weight of Boiler complete except Fire Brick and Saddles.... 100 lbs. steam	13300	15400	19000	21500	25500	36400	43800	52300
Estimated Weight of Boiler complete except Fire Brick and Saddles.... 130 lbs. steam	14900	17500	21500	24900	29300	41600	50900	61800
Estimated Weight of Boiler complete except Fire Brick and Saddles.... 160 lbs. steam	17000	19800	24500	28600	33200	47500	58400	70700
Estimated Weight of Boiler complete except Fire Brick and Saddles.... 200 lbs. steam	19400	22600	29000	32700	39400	55700	68100	83800
Estimated Weight of Fire Brick	4250	4450	5600	6250	7100	9300	11000	12800
Cu. ft. of Water contained, when Water-line is 5 ins. over top of Tubes	146	188	233	257	305	445	522	615

General Proportions of Type "B" Boilers Ranging from 100 to 300 Horse Power.

Rated Horse Power	100	125	150	200	250	300
Grate Surface in square feet	20	25	30	40	50	60
Heating Surface in square feet	797	1001	1176	1662	2004	2403
Ratio of H. S. to G. S.	39.8 to 1	40. to 1	39.2 to 1	41.5 to 1	40. to 1	40. to 1
Diameter of Tubes	4ins.	4ins.	4ins.	4ins.	4ins.	4ins.
Number of Tubes	40	52	62	84	104	127
Length of Tubes	16ft. 0ins.	16ft. 0ins.	16ft. 0ins.	16ft. 0ins.	16ft. 0ins.	16ft. 0ins.
Area through Tubes in square feet	3.04	3.95	4.71	6.38	7.91	9.65
Ratio Area through Tubes to Grate Surface	1 to 6.57	1 to 6.33	1 to 6.37	1 to 6.27	1 to 6.32	1 to 6.22
Inside Diameter of Boiler Shell	6ft. 9ins.	7ft. 3ins.	7ft. 9ins.	9ft. 4ins.	10ft. 0ins.	10ft. 9ins.
Inside Diameter of Corrugated Furnace	38ins.	41ins.	45ins.	38ins.	41ins.	45ins.
Length of Grate	6ft. 4ins.	7ft. 4ins.	8ft. 0ins.	6ft. 4ins.	7ft. 4ins.	8ft. 0ins.
Depth of Combustion Chamber	2ft. 6ins.	2ft. 6ins.	2ft. 6ins.	2ft. 6ins.	2ft. 6ins.	2ft. 6ins.
Estimated Weight of Boiler complete except Fire Brick and Saddles — 100 lbs. steam	21400	24400	28200	42500	48400	54800
Estimated Weight of Boiler complete except Fire Brick and Saddles — 130 lbs. steam	24400	28500	32200	48200	55400	63500
Estimated Weight of Boiler complete except Fire Brick and Saddles — 160 lbs. steam	27600	31900	36400	54900	63800	73700
Estimated Weight of Boiler complete except Fire Brick and Saddles — 200 lbs. steam	31900	37000	42300	64300	75000	88200
Estimated Weight of Fire Brick	5350	5850	6700	9100	10200	11400
Cu. Ft. of Water contained, when Water-line is 5ins. over top of Tubes	282	320	363	543	605	683



SECTIONAL ELEVATION OF AN INTERNAL FURNACE BOILER.



FURNACES FOR BOILERS OF CHICAGO CITY WATER WORKS,
CHICAGO, ILL.

DESIGN OF

50 H. P. BOILER,

TYPE A.

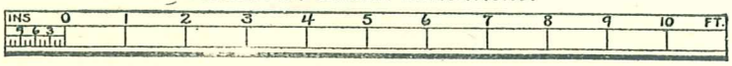
INTERNAL FURNACE BOILER OF 50 HO

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW YOR

1912.

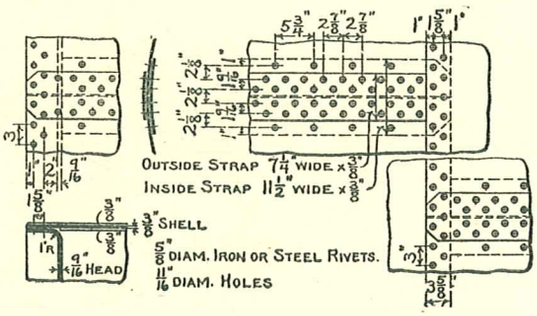
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL ——— 12 FT. 7½ INS.
THICKNESS OF SHELL ——— 9/16 IN.
THICKNESS OF HEADS ——— 9/16 IN.
THICKNESS OF MORISON FURNACE ——— 5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS ——— 2 INS.
DIAMETER OF THREADED BOLT ENDS ——— 2 3/8 INS.

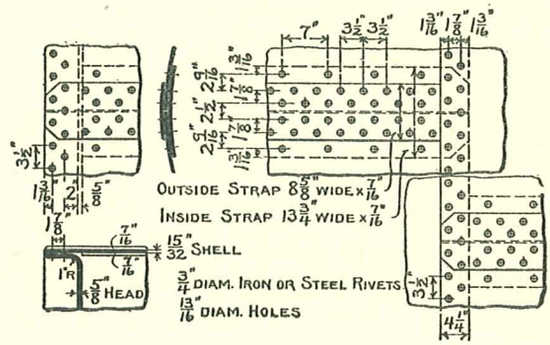
PLAN OF RIVETING.

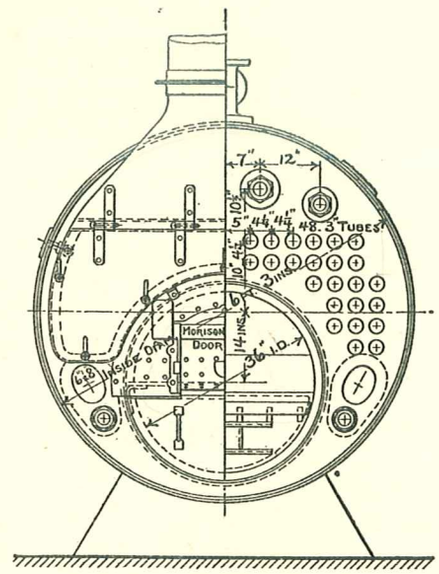


130 LBS. STEAM PRESSURE.

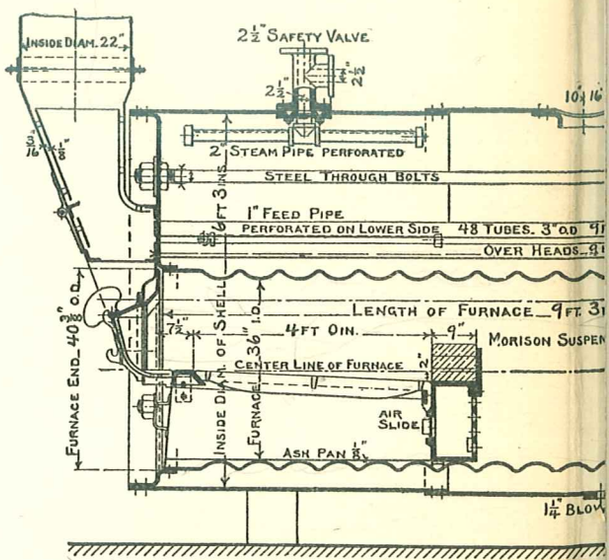
LENGTH OF BOILER OVER ALL ——— 12 FT. 8 INS.
THICKNESS OF SHELL ——— 15/32 IN.
THICKNESS OF HEADS ——— 5/8 IN.
THICKNESS OF MORISON FURNACE ——— 11/32 IN.
DIAMETER OF STEEL THROUGH BOLTS ——— 2¼ INS.
DIAMETER OF THREADED BOLT ENDS ——— 2 5/8 INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONAL EL

DRAWING No. 1.

OF 50 HORSE POWER. TYPE A.

NED BY

, NEW YORK (BOROUGH OF BROOKLYN.)

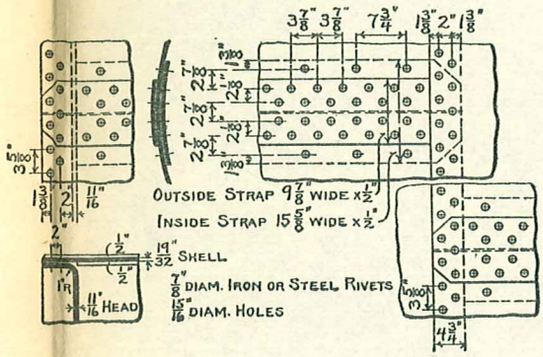
12.

SCALE FOR RIVETING PLANS.

160 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	12 FT. 8¼ INS.
THICKNESS OF SHELL	19/32 IN.
THICKNESS OF HEADS	11/16 IN.
THICKNESS OF MORISON FURNACE	13/32 IN.
DIAMETER OF STEEL THROUGH BOLTS	2½ INS.
DIAMETER OF THREADED BOLT ENDS	2⅞ INS.

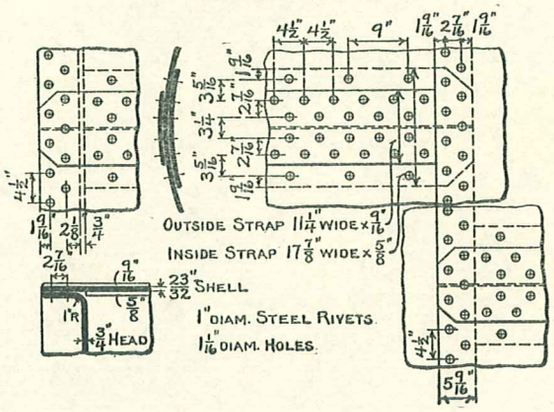
PLAN OF RIVETING.

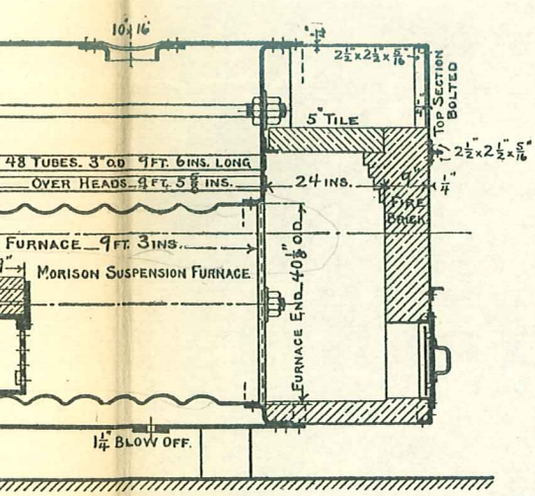


200 LBS. STEAM PRESSURE.

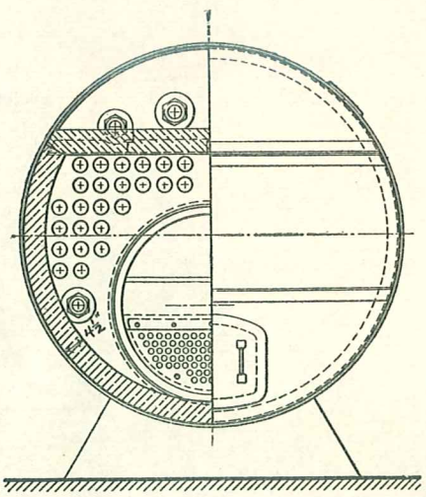
LENGTH OF BOILER OVER ALL	12 FT. 9 INS.
THICKNESS OF SHELL	23/32 IN.
THICKNESS OF HEADS	¾ IN.
THICKNESS OF MORISON FURNACE	½ IN.
DIAMETER OF STEEL THROUGH BOLTS	2¾ INS.
DIAMETER OF THREADED BOLT ENDS	3⅛ INS.

PLAN OF RIVETING.

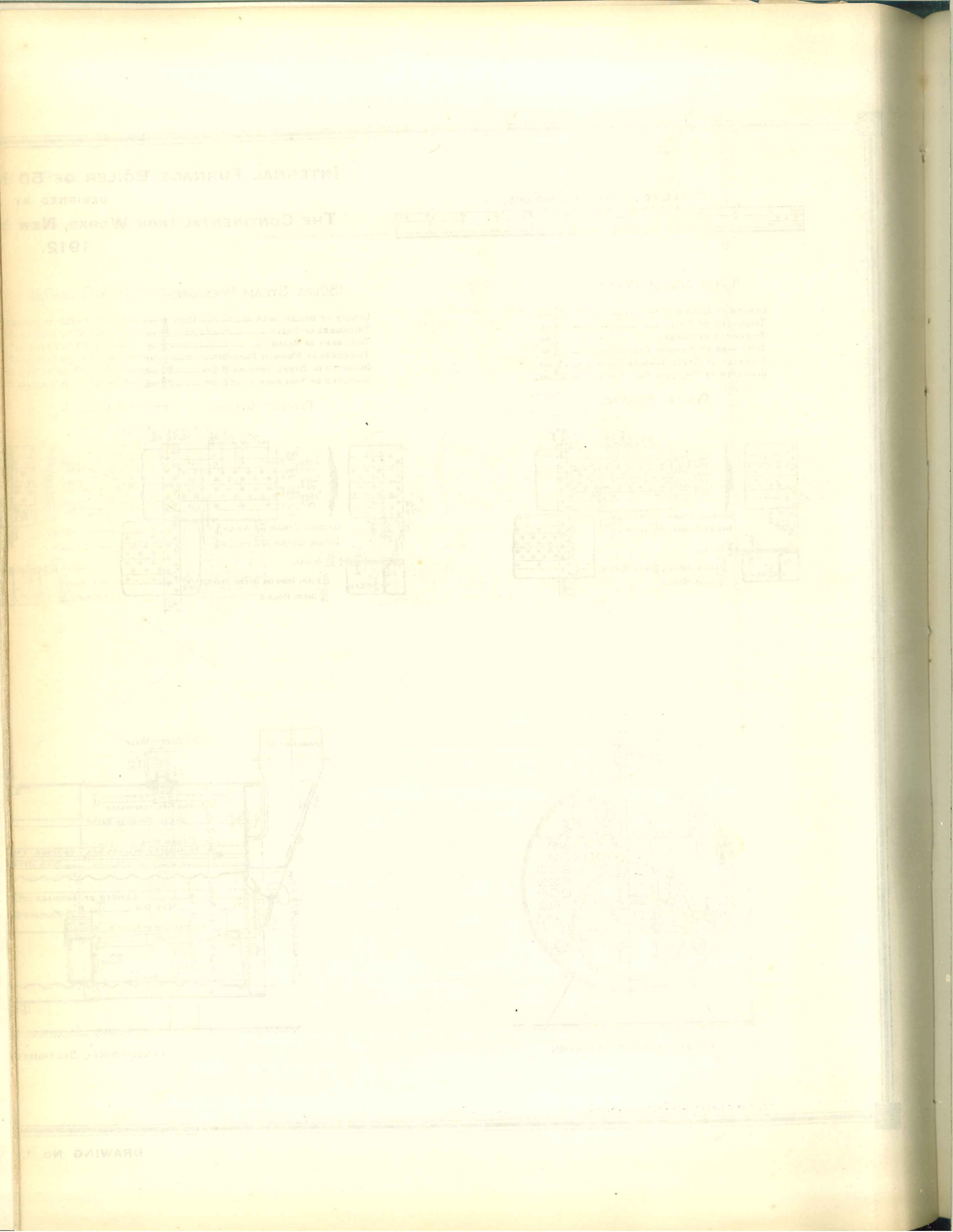




SECTIONAL ELEVATION.



SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.



DESIGN OF

75 H. P. BOILER,

TYPE A.

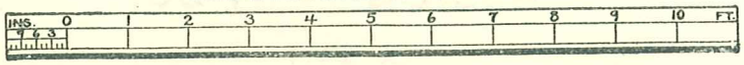
INTERNAL FURNACE BOILER OF 75

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW

1912.

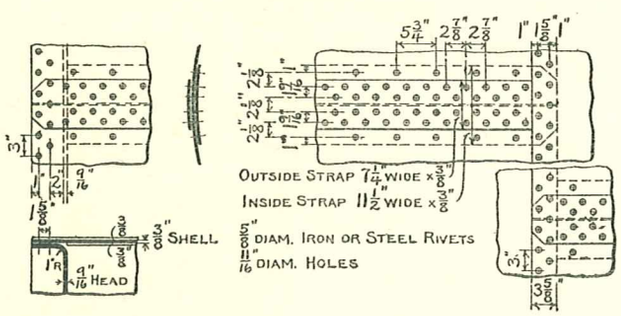
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	14 FT. 7½ INS.
THICKNESS OF SHELL	3/8 IN.
THICKNESS OF HEADS	7/16 IN.
THICKNESS OF MORISON FURNACE	5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS	2 INS.
DIAMETER OF THREADED BOLT ENDS	2 3/8 INS.

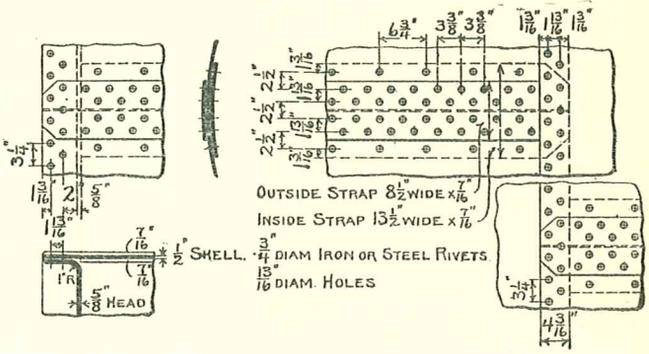
PLAN OF RIVETING.

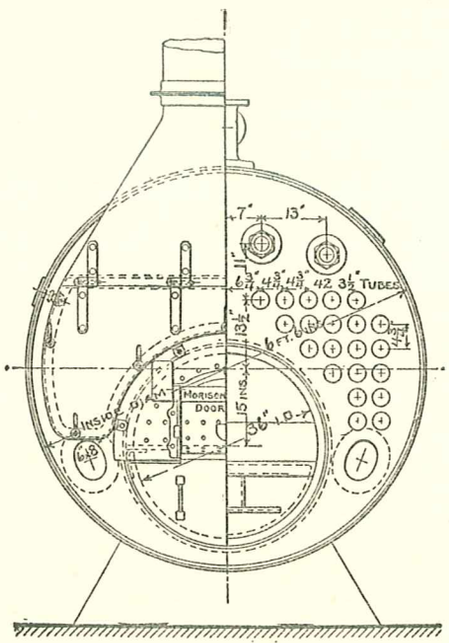


130 LBS. STEAM PRESSURE.

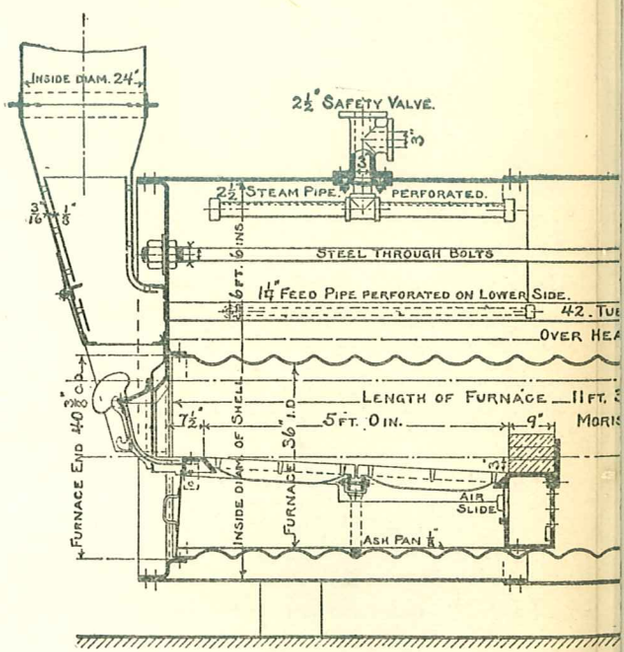
LENGTH OF BOILER OVER ALL	14 FT. 8 INS.
THICKNESS OF SHELL	½ IN.
THICKNESS OF HEADS	7/16 IN.
THICKNESS OF MORISON FURNACE	11/32 IN.
DIAMETER OF STEEL THROUGH BOLTS	2¼ INS.
DIAMETER OF THREADED BOLT ENDS	2⅝ INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTION

DRAWING NO.

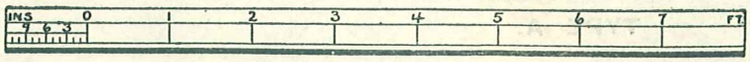
OF 75 HORSE POWER. TYPE A.

SIGNED BY

KS, NEW YORK (BOROUGH OF BROOKLYN.)

1912.

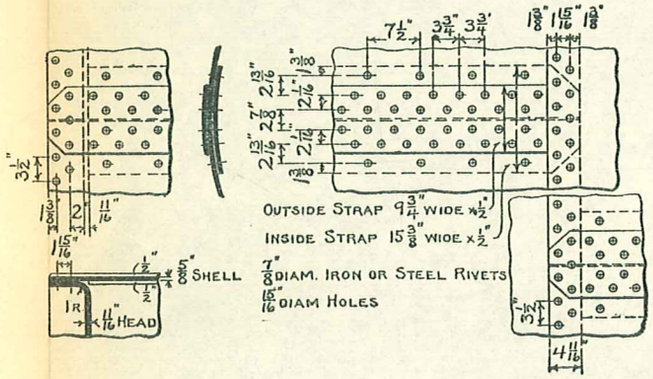
SCALE FOR RIVETING PLANS.



160 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	14 FT. 8¼ INS.
THICKNESS OF SHELL	5/8 IN.
THICKNESS OF HEADS	11/16 IN.
THICKNESS OF MORISON FURNACE	13/32 IN.
DIAMETER OF STEEL THROUGH BOLTS	2½ INS.
DIAMETER OF THREADED BOLT ENDS	2⅞ INS.

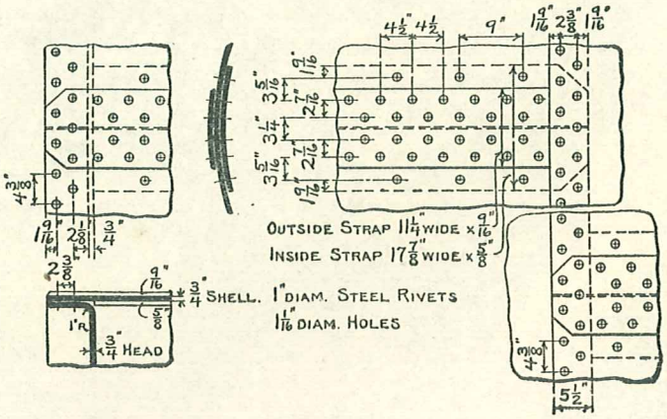
PLAN OF RIVETING

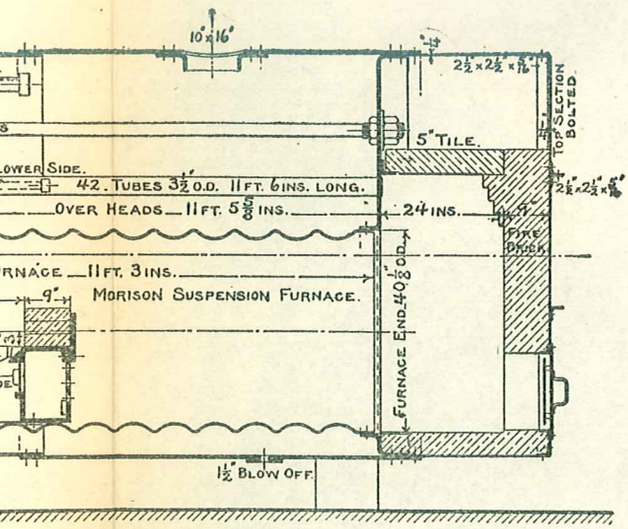


200 LBS. STEAM PRESSURE.

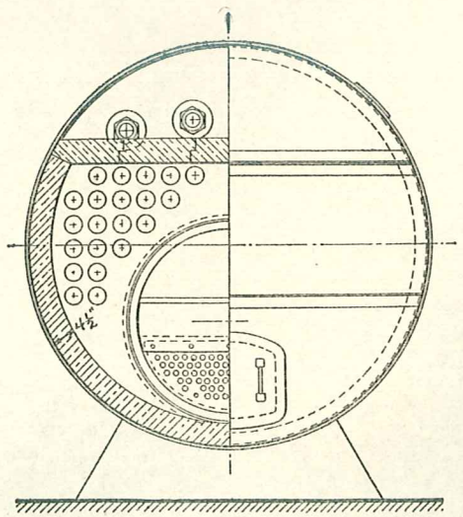
LENGTH OF BOILER OVER ALL	14 FT. 9 INS.
THICKNESS OF SHELL	¾ IN.
THICKNESS OF HEADS	¾ IN.
THICKNESS OF MORISON FURNACE	½ IN.
DIAMETER OF STEEL THROUGH BOLTS	2¾ INS.
DIAMETER OF THREADED BOLT ENDS	3⅛ INS.

PLAN OF RIVETING.



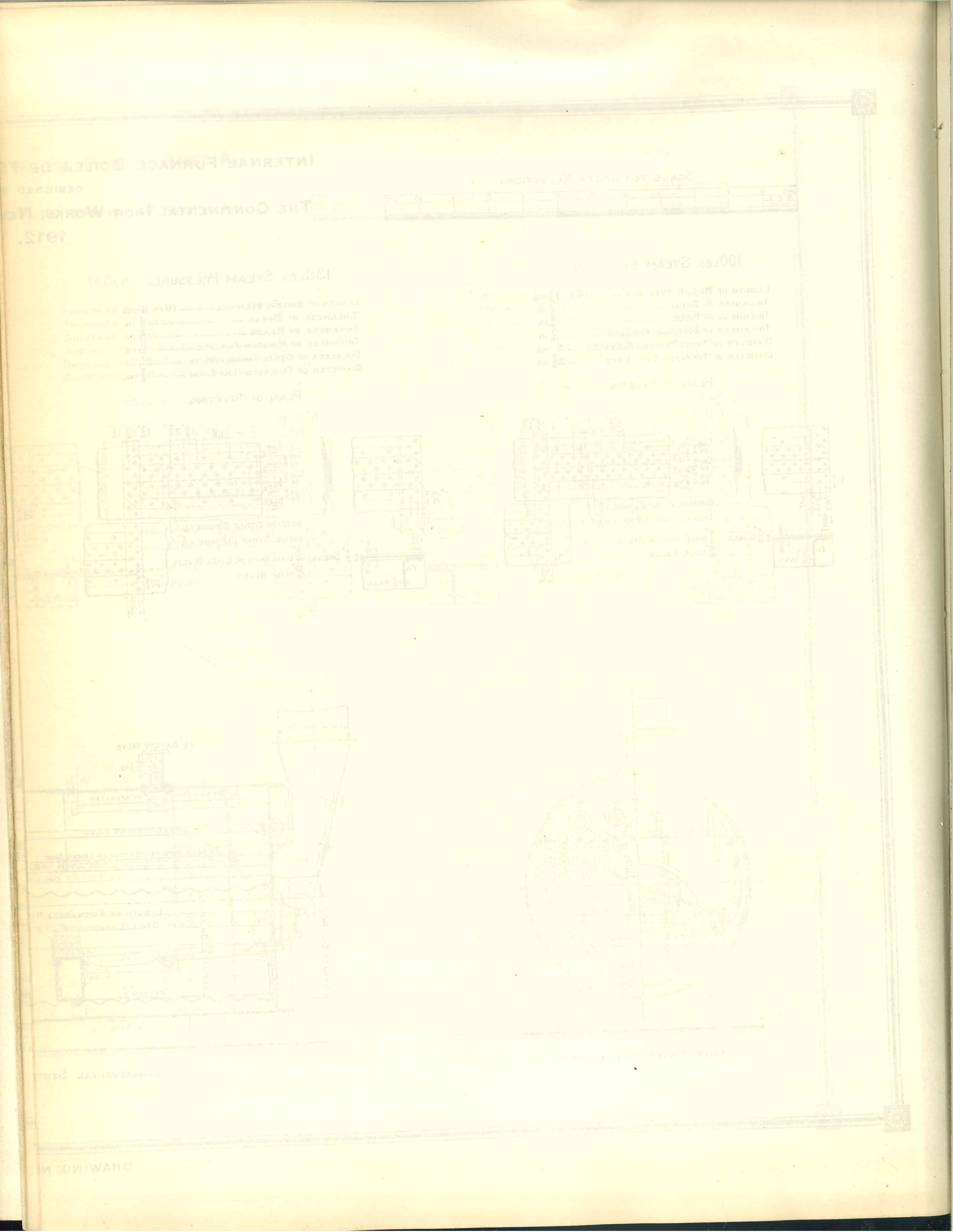


NAL SECTIONAL ELEVATION.



SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.

AWING NO. 2.



DESIGN OF

100 H. P. BOILER,

TYPE A.

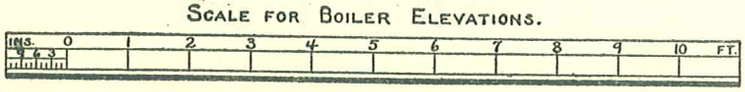
INTERNAL FURNACE BOILER OF 100

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW

1912.

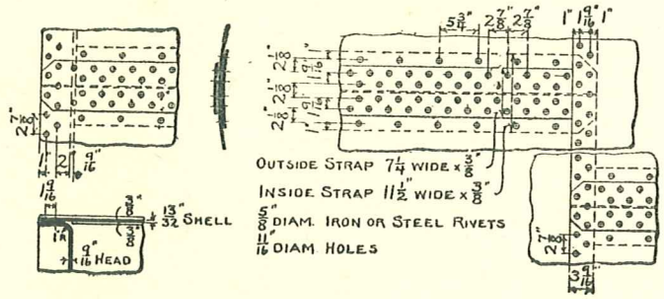
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	16 FT. 1½ INS.
THICKNESS OF SHELL	13/32 IN.
THICKNESS OF HEADS	9/16 IN.
THICKNESS OF MORISON FURNACE	5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS	2 INS.
DIAMETER OF THREADED BOLT ENDS	2⅜ INS.

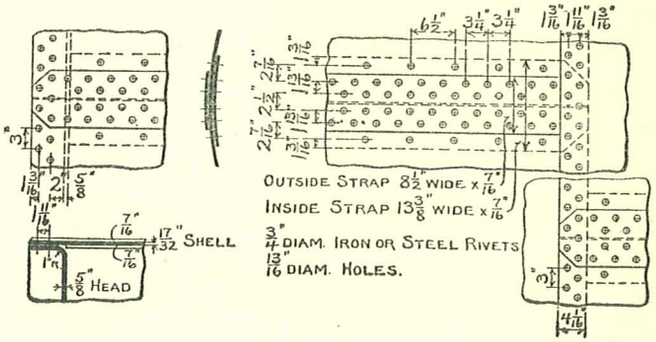
PLAN OF RIVETING.

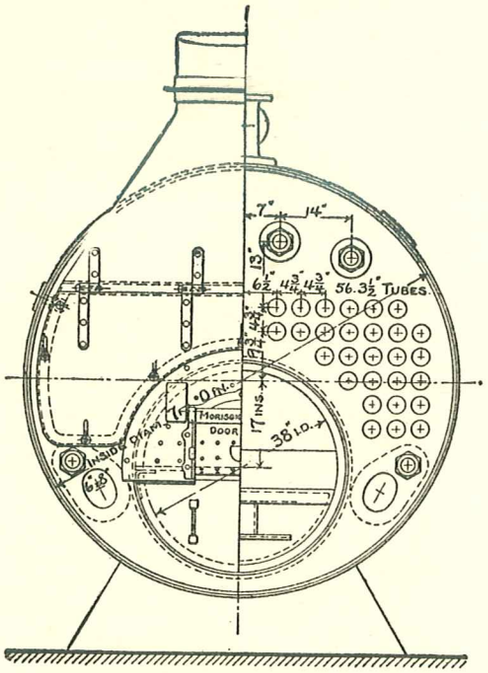


130 LBS. STEAM PRESSURE.

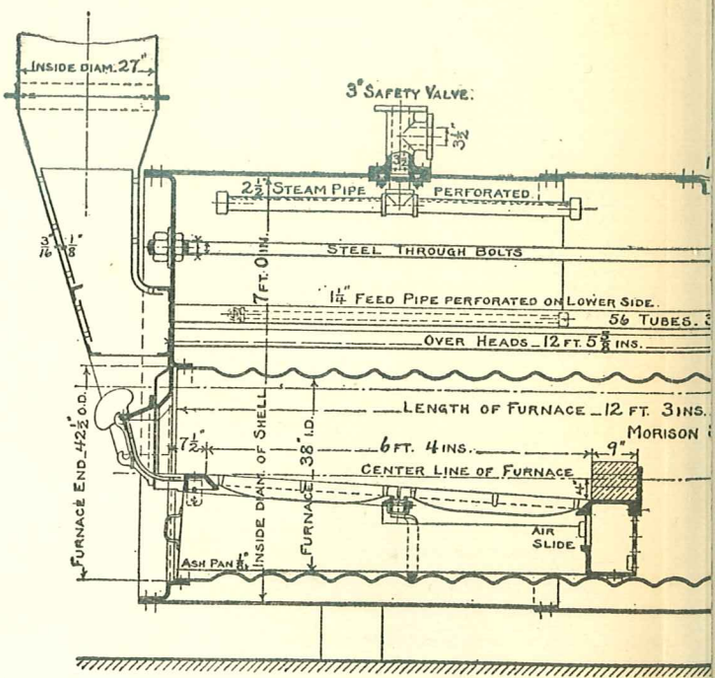
LENGTH OF BOILER OVER ALL	16 FT. 1¾ INS.
THICKNESS OF SHELL	17/32 IN.
THICKNESS OF HEADS	5/8 IN
THICKNESS OF MORISON FURNACE	11/32 IN
DIAMETER OF STEEL THROUGH BOLTS	2¼ INS.
DIAMETER OF THREADED BOLT ENDS	2⅝ INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONAL E

DRAWING No. 3.

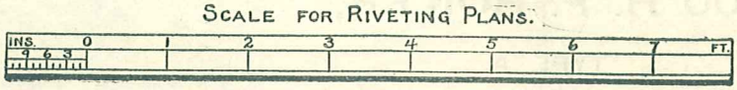
R OF 100 HORSE POWER. TYPE A.

DESIGNED BY

ORKS, NEW YORK (BOROUGH OF BROOKLYN.)

1912.

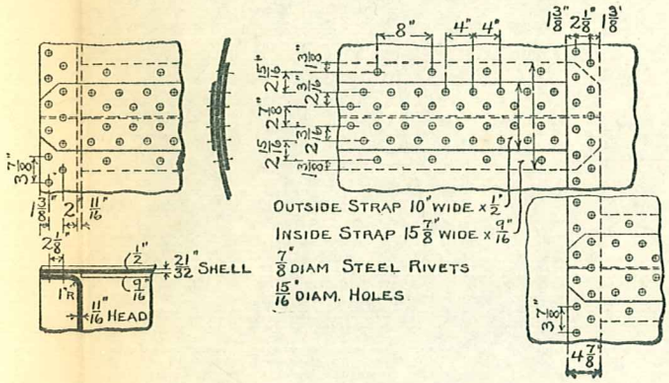
SCALE FOR RIVETING PLANS.



160LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	16 FT 2½ INS.
THICKNESS OF SHELL	21/32 IN.
THICKNESS OF HEADS	11/16 IN
THICKNESS OF MORISON FURNACE	7/16 IN
DIAMETER OF STEEL THROUGH BOLTS	2½ INS
DIAMETER OF THREADED BOLT ENDS	2⅞ INS.

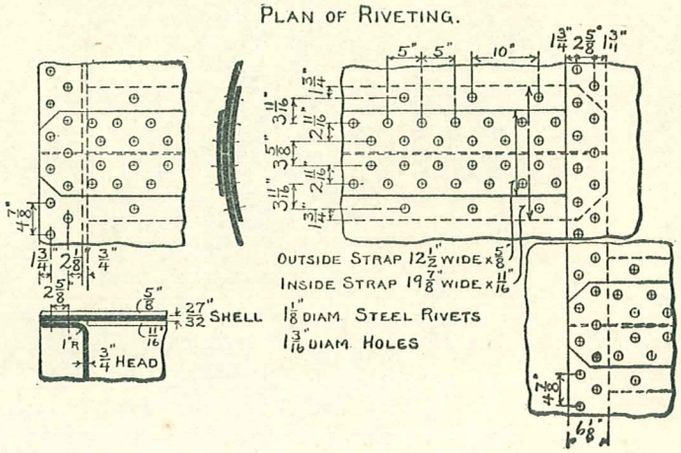
PLAN OF RIVETING.

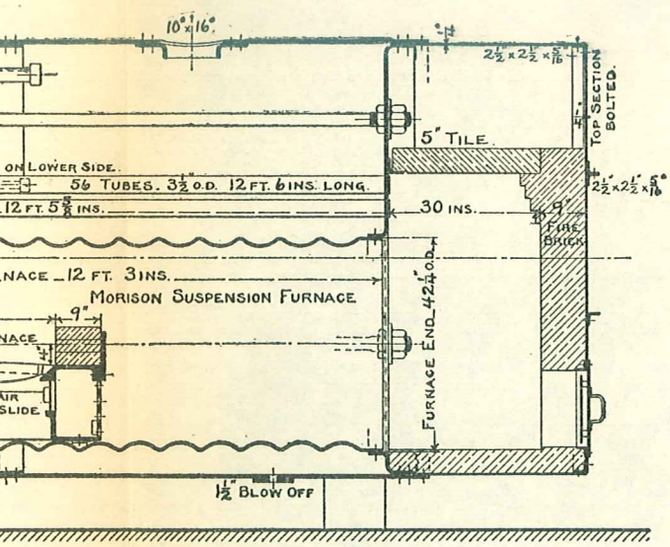


200LBS. STEAM PRESSURE.

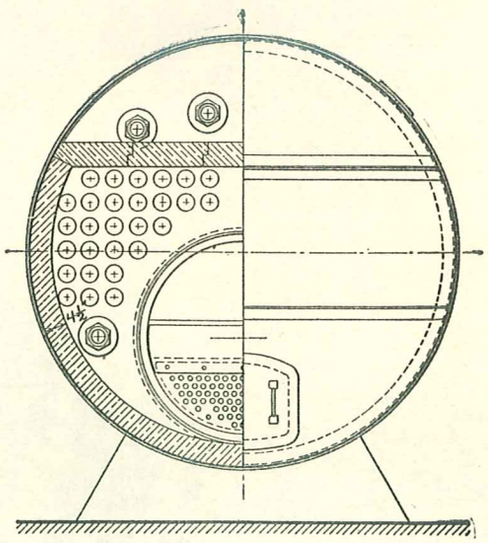
LENGTH OF BOILER OVER ALL	16 FT 3½ INS.
THICKNESS OF SHELL	27/32 IN.
THICKNESS OF HEADS	¾ IN.
THICKNESS OF MORISON FURNACE	17/32 IN.
DIAMETER OF STEEL THROUGH BOLTS	2¾ INS
DIAMETER OF THREADED BOLT ENDS	3⅛ INS.

PLAN OF RIVETING.



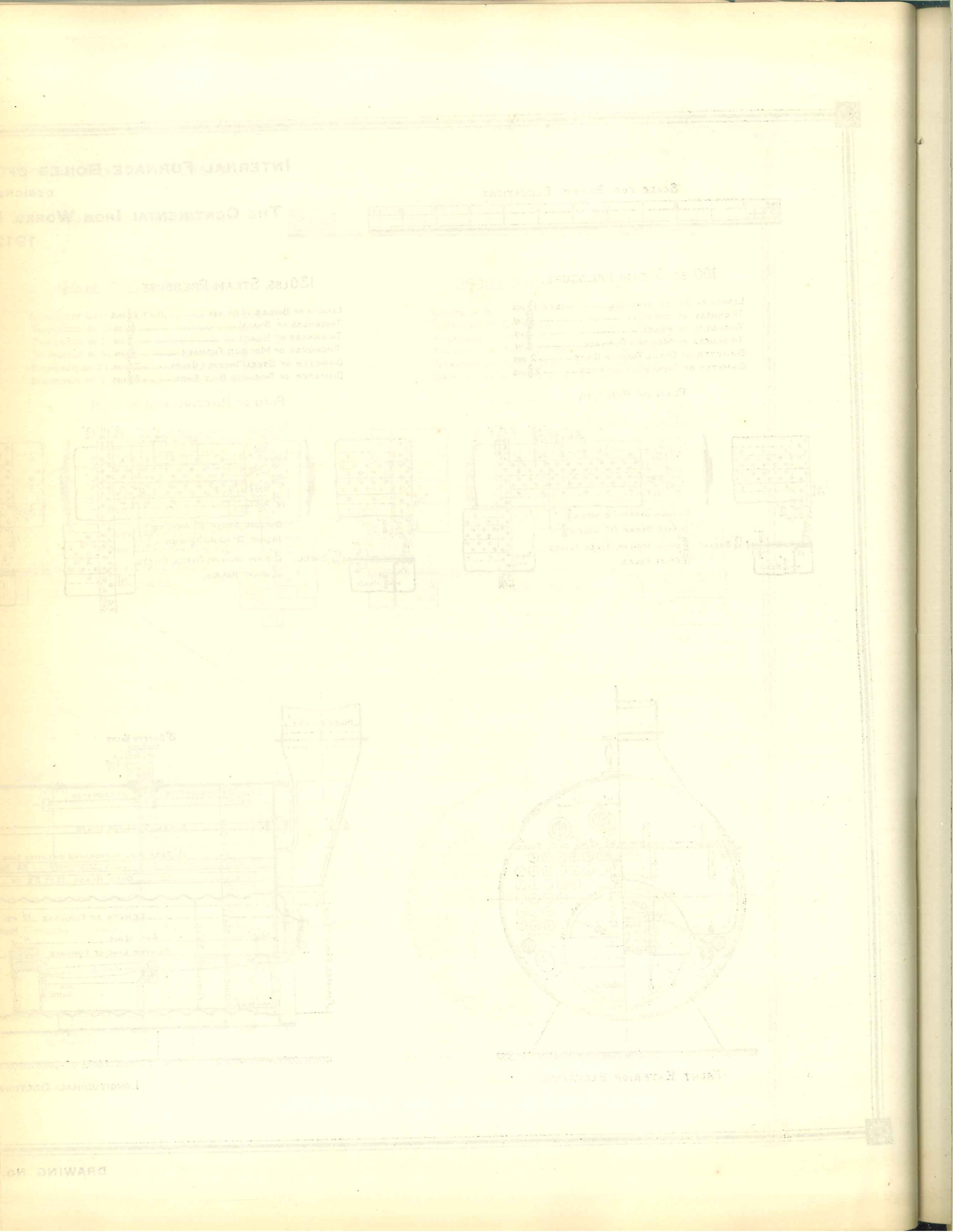


AL SECTIONAL ELEVATION.



SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.

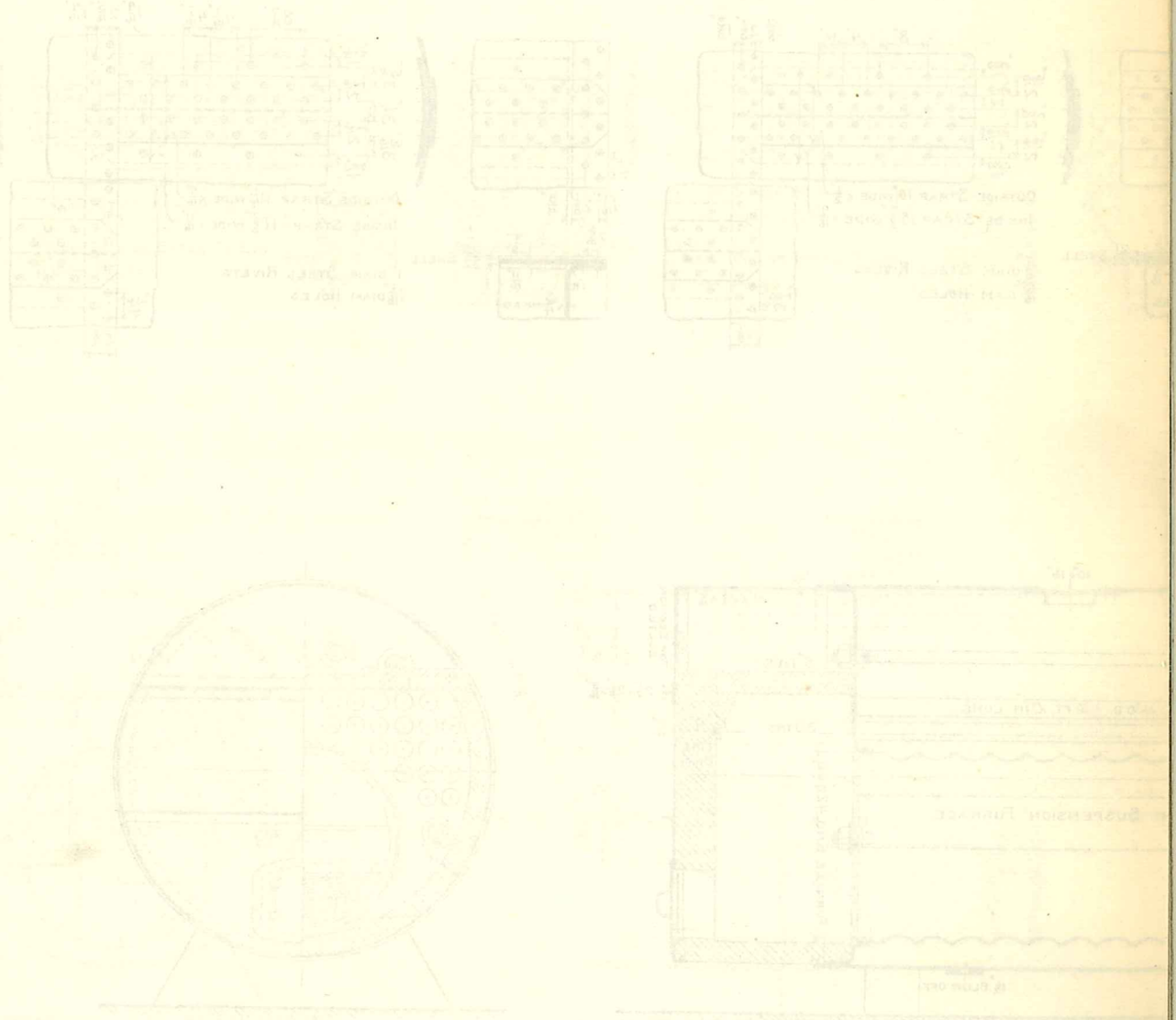
WING No. 3.



DESIGN OF

100 H. P. BOILER,

TYPE B.



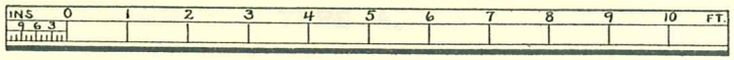
INTERNAL FURNACE BOILER OF 100 H

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW Y

1912.

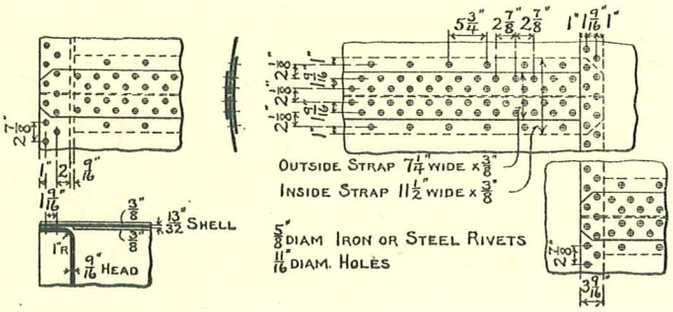
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	19 FT. 7½ INS.
THICKNESS OF SHELL	13/32 IN.
THICKNESS OF HEADS	9/16 IN.
THICKNESS OF MORISON FURNACE	7/16 IN.
DIAMETER OF STEEL THROUGH BOLTS	2 INS.
DIAMETER OF THREADED BOLT ENDS	2⅜ INS.

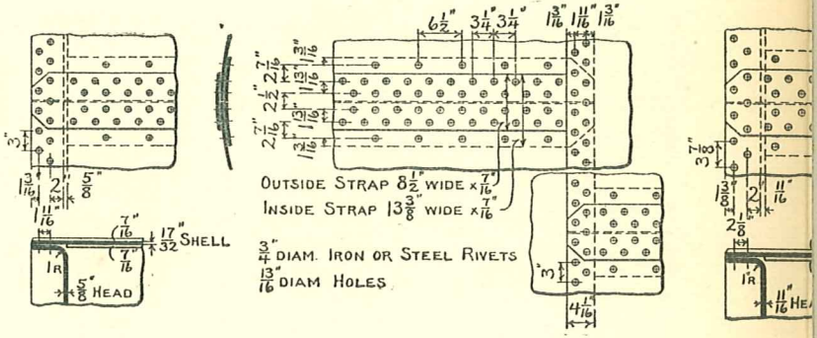
PLAN OF RIVETING

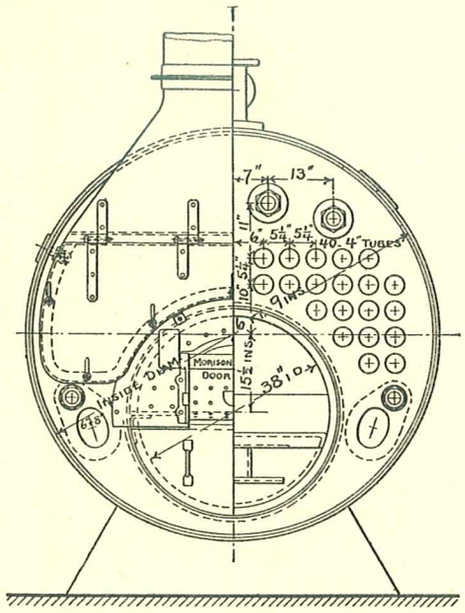


130 LBS. STEAM PRESSURE.

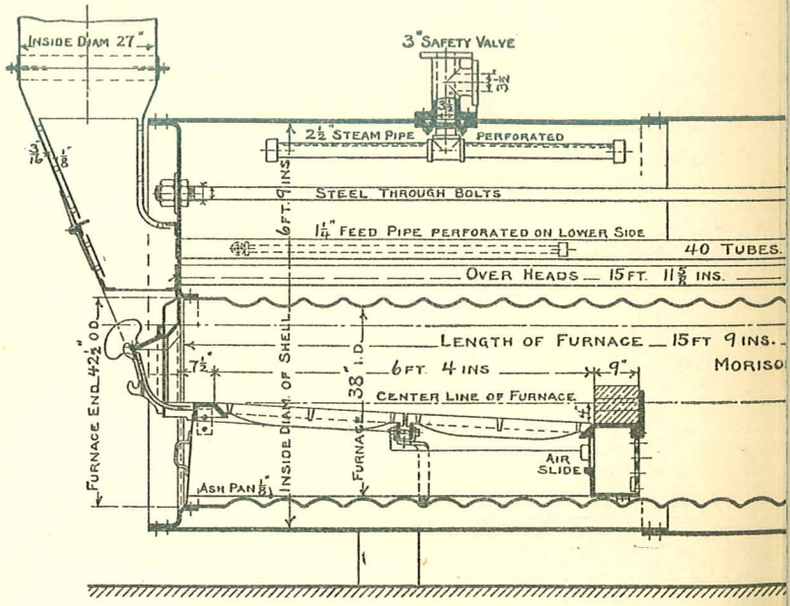
LENGTH OF BOILER OVER ALL	19 FT 7¾ INS.
THICKNESS OF SHELL	17/32 IN.
THICKNESS OF HEADS	5/8 IN.
THICKNESS OF MORISON FURNACE	11/32 IN
DIAMETER OF STEEL THROUGH BOLTS	2¼ INS.
DIAMETER OF THREADED BOLT ENDS	2⅝ INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONA

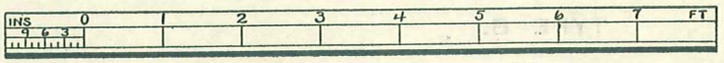
100 Horse Power. Type B.

ED BY

NEW YORK (BOROUGH OF BROOKLYN.)

2.

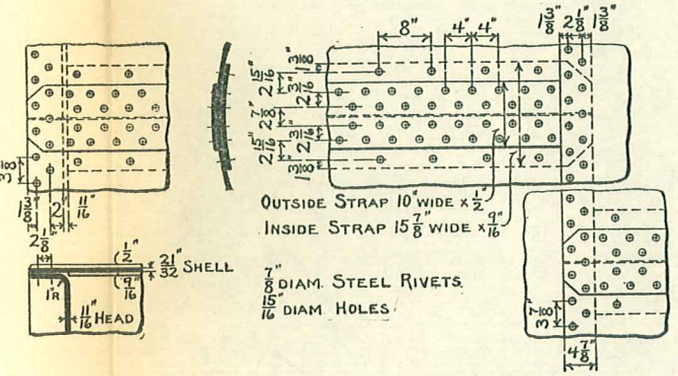
SCALE FOR RIVETING PLANS



160 LBS. STEAM PRESSURE

LENGTH OF BOILER OVER ALL —— 19 FT 8½ INS.
THICKNESS OF SHELL —— 21/32 IN.
THICKNESS OF HEADS —— 11/16 IN.
THICKNESS OF MORISON FURNACE —— 7/16 IN
DIAMETER OF STEEL THROUGH BOLTS —— 2½ INS
DIAMETER OF THREADED BOLT ENDS —— 2⅞ INS

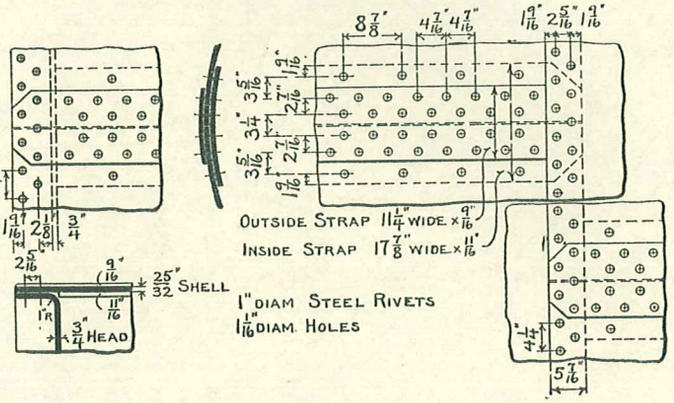
PLAN OF RIVETING

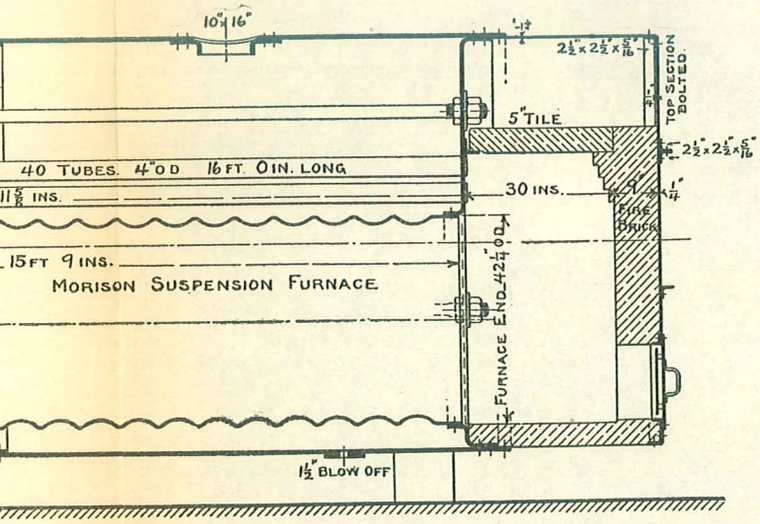


200 LBS. STEAM PRESSURE.

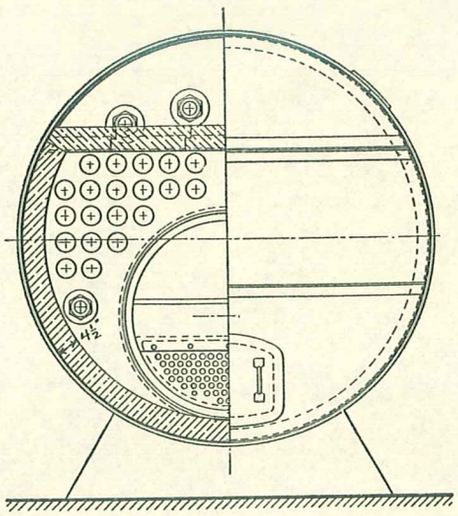
LENGTH OF BOILER OVER ALL —— 19 FT 9 INS.
THICKNESS OF SHELL —— 25/32 IN
THICKNESS OF HEADS —— 3/4 IN
THICKNESS OF MORISON FURNACE —— 7/16 IN
DIAMETER OF STEEL THROUGH BOLTS —— 2¾ INS
DIAMETER OF THREADED BOLT ENDS —— 3⅛ INS

PLAN OF RIVETING



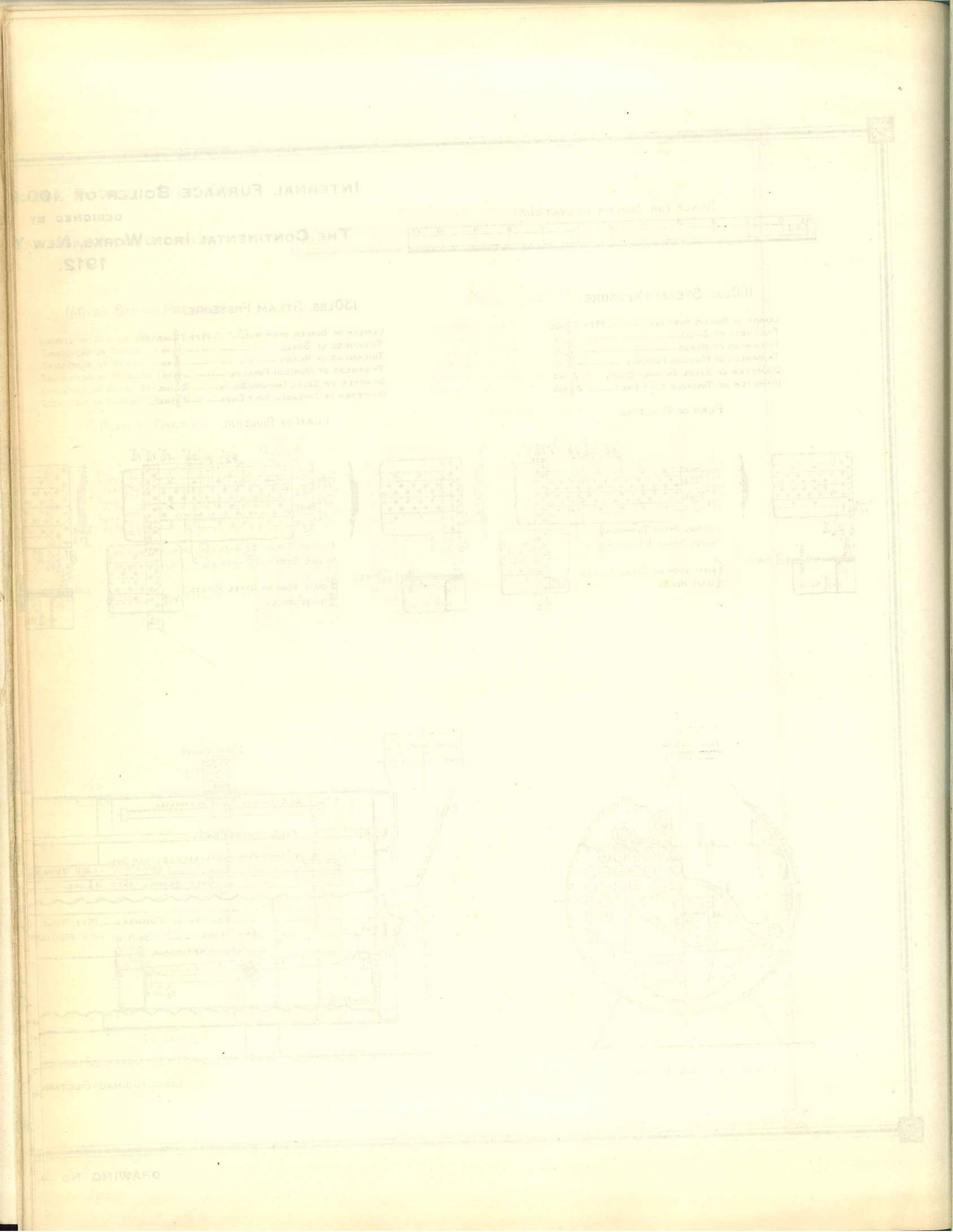


AL SECTIONAL ELEVATION.



SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.

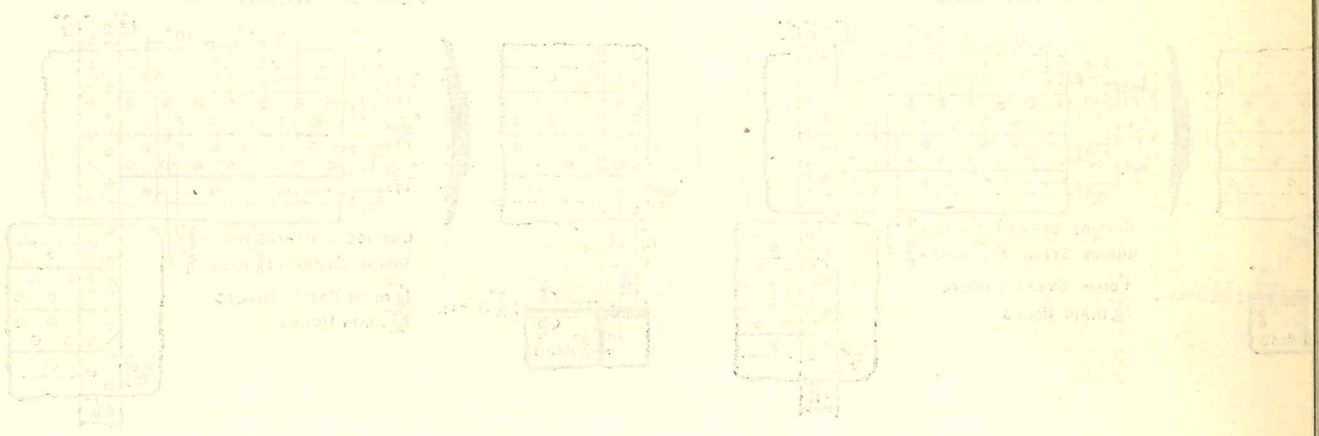
NG NO 4.

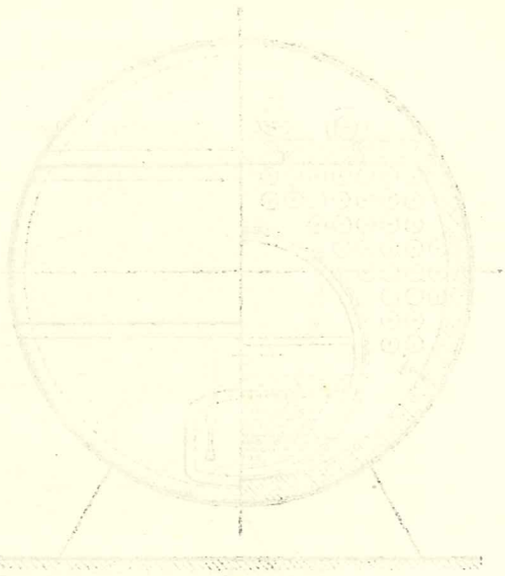


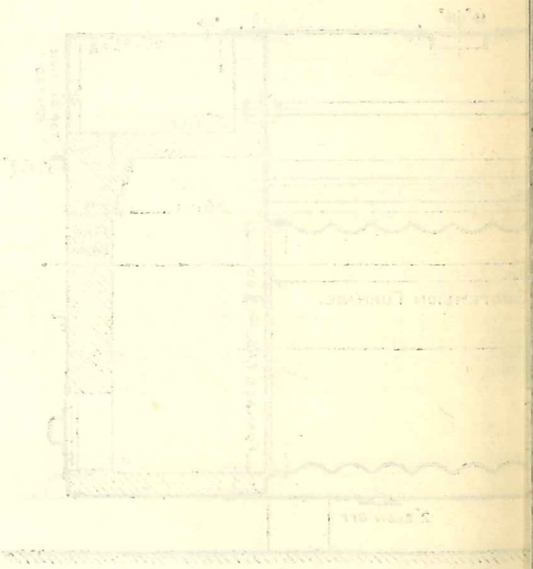
DESIGN OF

125 H. P. BOILER,

TYPE A.







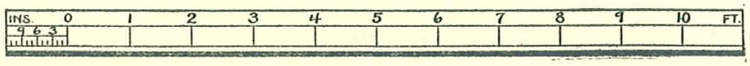
INTERNAL FURNACE BOILER OF 125 H

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW Y

1912.

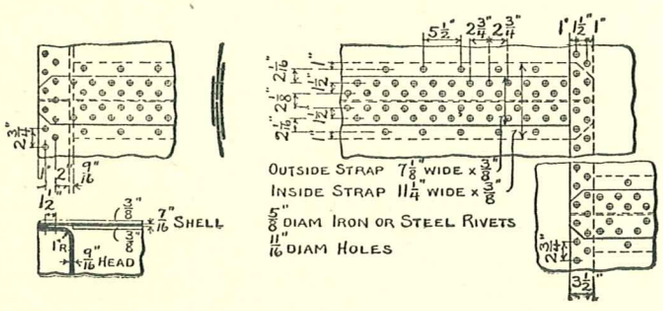
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL — 16 FT 1½ INS.
THICKNESS OF SHELL — 7/16 IN
THICKNESS OF HEADS — 9/16 IN.
THICKNESS OF MORISON FURNACE — 5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS — 2 INS.
DIAMETER OF THREADED BOLT ENDS — 2⅜ INS.

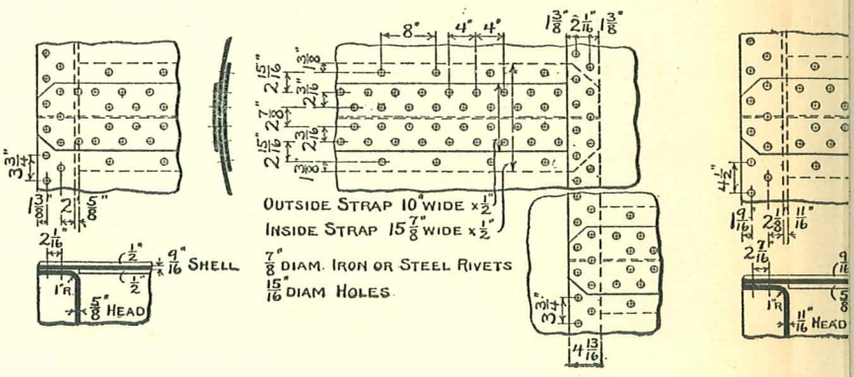
PLAN OF RIVETING.

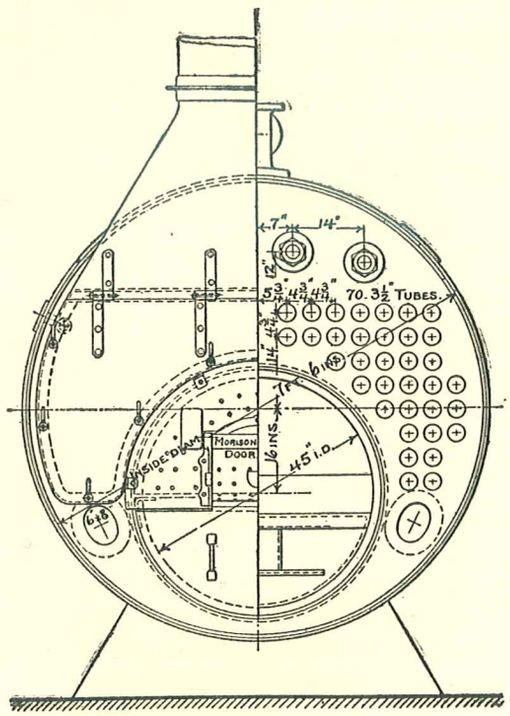


130 LBS. STEAM PRESSURE.

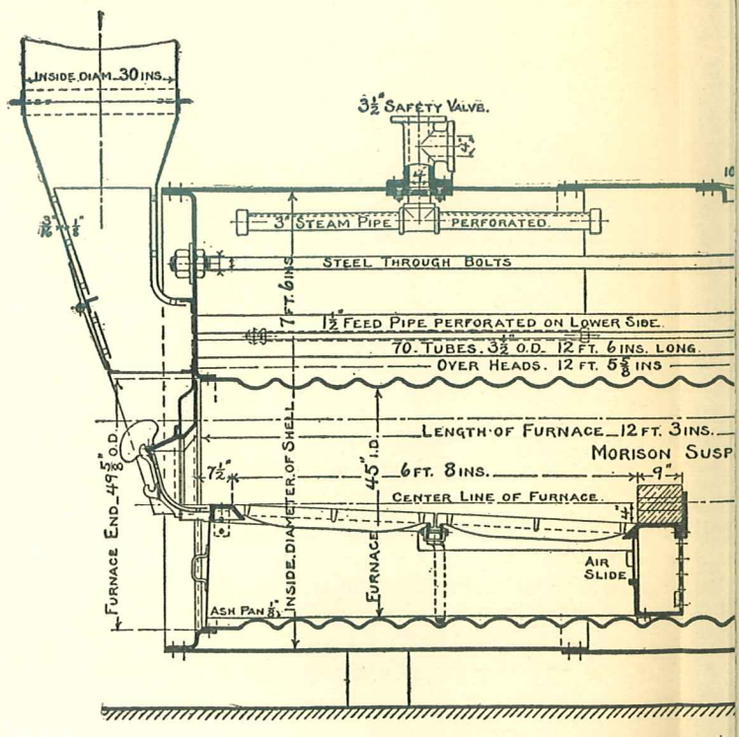
LENGTH OF BOILER OVER ALL — 16 FT 2¼ INS.
THICKNESS OF SHELL — 9/16 IN
THICKNESS OF HEADS — 5/8 IN.
THICKNESS OF MORISON FURNACE — 13/32 IN.
DIAMETER OF STEEL THROUGH BOLTS — 2¼ INS.
DIAMETER OF THREADED BOLT ENDS — 2⅝ INS.

PLAN OF RIVETING





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONAL E

DRAWING NO. 5.

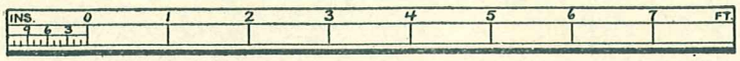
OF 125 HORSE POWER. TYPE A.

SIGNED BY

KS, NEW YORK (BOROUGH OF BROOKLYN.)

1912.

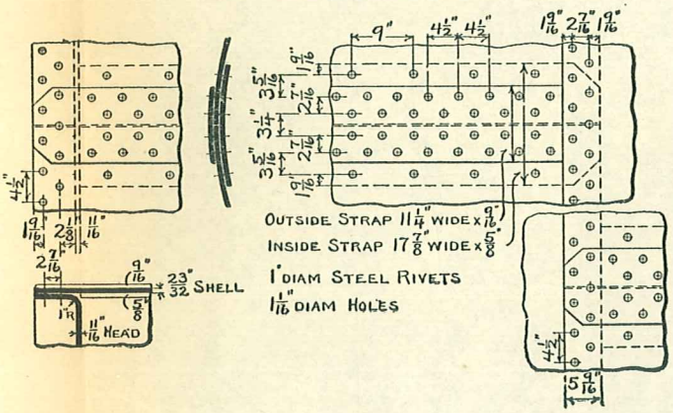
SCALE FOR RIVETING PLANS.



160 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL — 16 FT 3 INS.
THICKNESS OF SHELL — 23/32 IN.
THICKNESS OF HEADS — 11/16 IN
THICKNESS OF MORISON FURNACE — 1/2 IN.
DIAMETER OF STEEL THROUGH BOLTS — 2 1/2 INS.
DIAMETER OF THREADED BOLT ENDS — 2 7/8 INS.

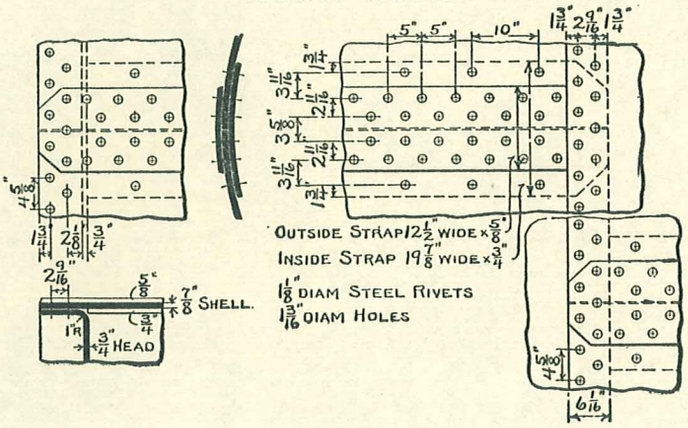
PLAN OF RIVETING.

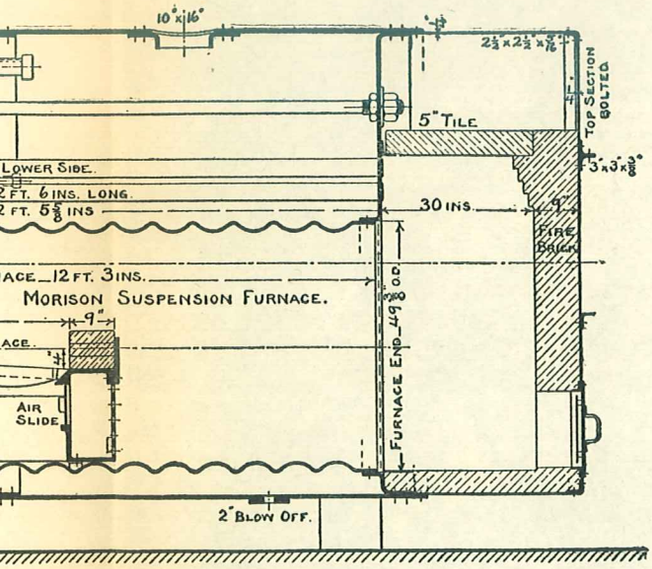


200 LBS. STEAM PRESSURE.

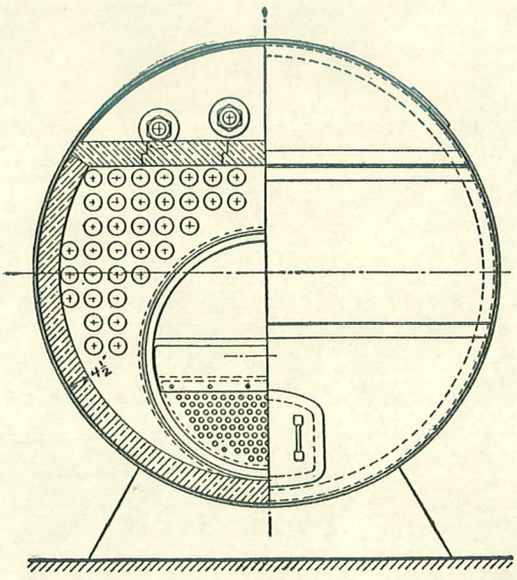
LENGTH OF BOILER OVER ALL — 16 FT 3 1/4 INS.
THICKNESS OF SHELL — 7/8 IN.
THICKNESS OF HEADS — 3/4 IN.
THICKNESS OF MORISON FURNACE — 13/16 IN.
DIAMETER OF STEEL THROUGH BOLTS — 2 3/4 INS.
DIAMETER OF THREADED BOLT ENDS — 3 1/8 INS.

PLAN OF RIVETING.



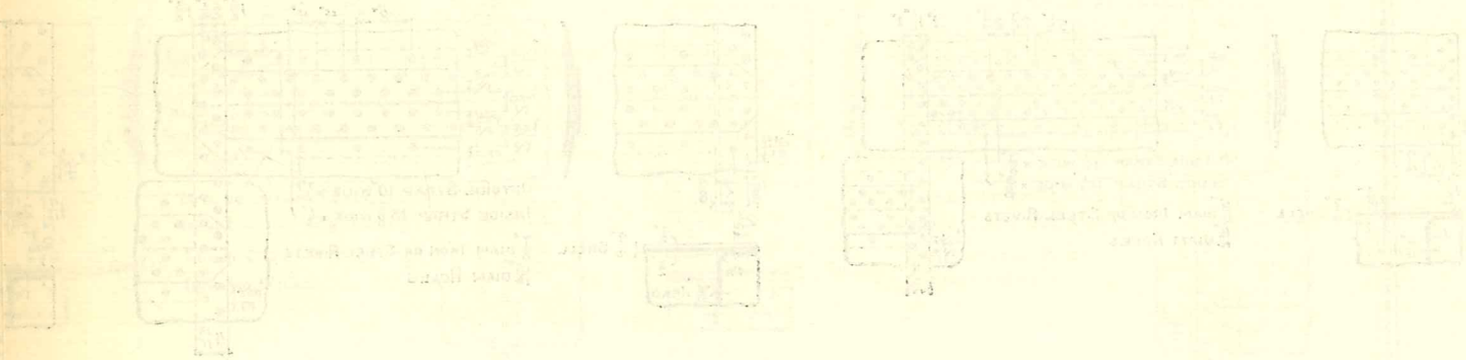


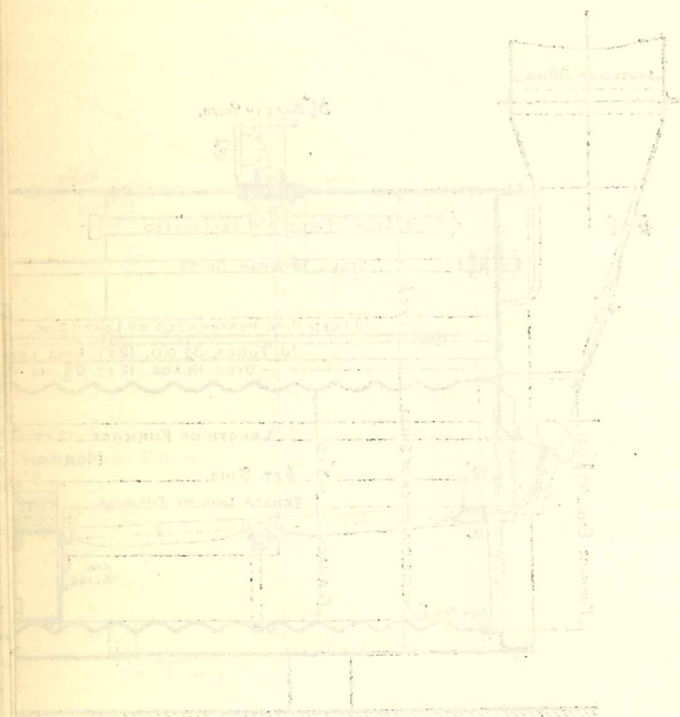
SECTIONAL ELEVATION.

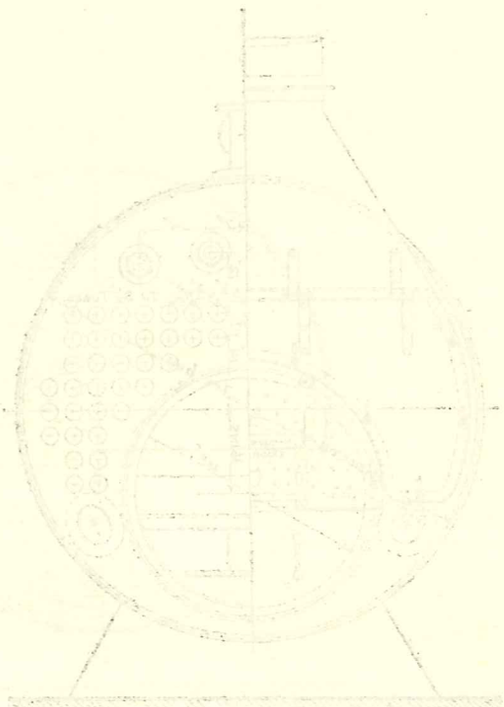


SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.

ING NO. 5.







DESIGN OF

125 H. P. BOILER,

TYPE B.

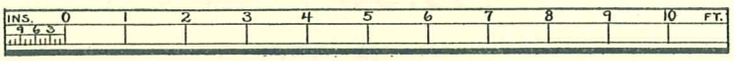
INTERNAL FURNACE BOILER OF 125 H

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW YO

1912.

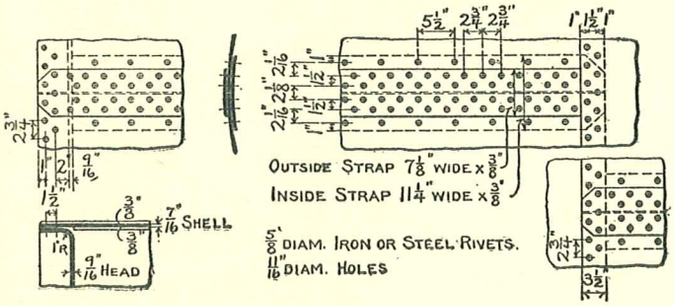
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE

LENGTH OF BOILER OVER ALL	19 FT 7½ INS.
THICKNESS OF SHELL	7/16 IN.
THICKNESS OF HEADS	9/16 IN.
THICKNESS OF MORISON FURNACE	5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS	2 INS.
DIAMETER OF THREADED BOLT ENDS	2⅜ INS.

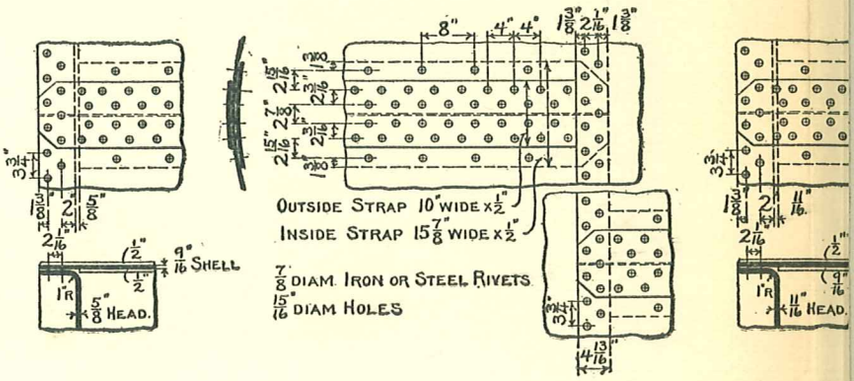
PLAN OF RIVETING.

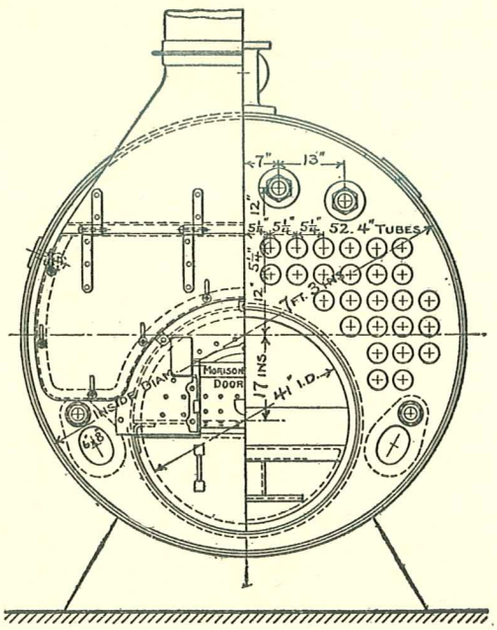


130 LBS. STEAM PRESSURE.

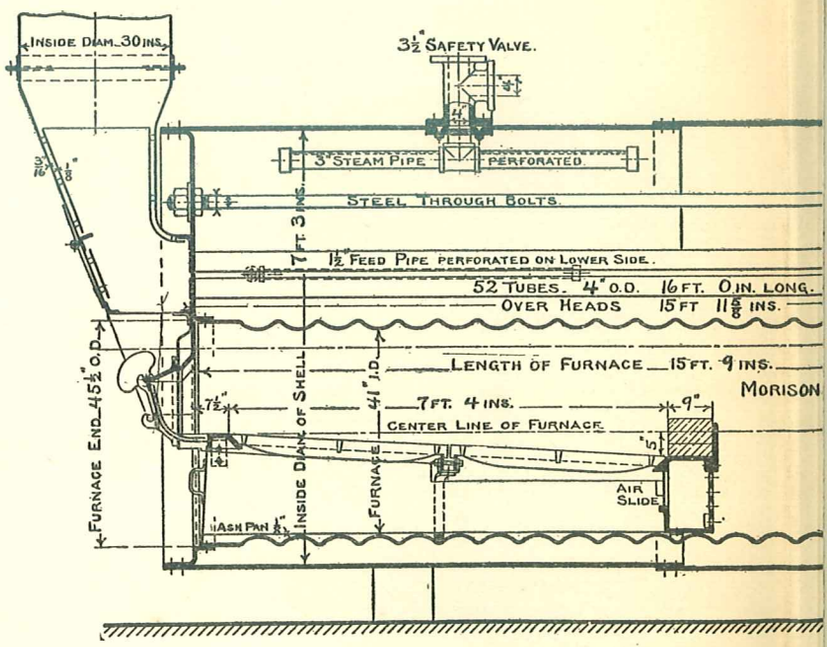
LENGTH OF BOILER OVER ALL	19 FT. 8½ INS.
THICKNESS OF SHELL	9/16 IN.
THICKNESS OF HEADS	5/8 IN.
THICKNESS OF MORISON FURNACE	5/8 IN.
DIAMETER OF STEEL THROUGH BOLTS	2¼ INS.
DIAMETER OF THREADED BOLT ENDS	2⅝ INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONAL

DRAWING NO. 6.

OF 125 HORSE POWER. TYPE B.

SIGNED BY

KS, NEW YORK (BOROUGH OF BROOKLYN.)

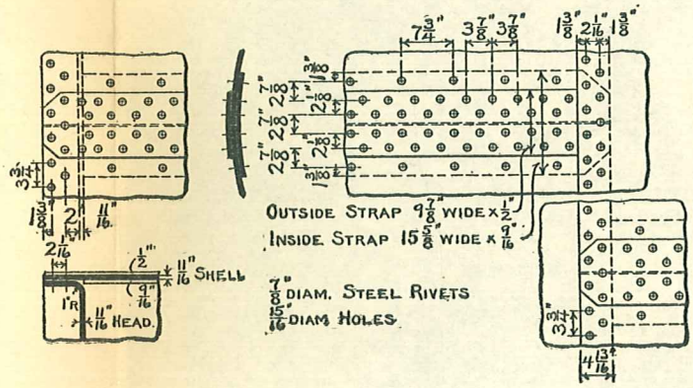
1912.

SCALE FOR RIVETING PLANS.

160 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL ——— 19 FT. 8¼ INS.
THICKNESS OF SHELL ——— 11/16 IN.
THICKNESS OF HEADS ——— 11/16 IN.
THICKNESS OF MORISON FURNACE ——— 5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS ——— 2½ INS.
DIAMETER OF THREADED BOLT ENDS ——— 2⅞ INS.

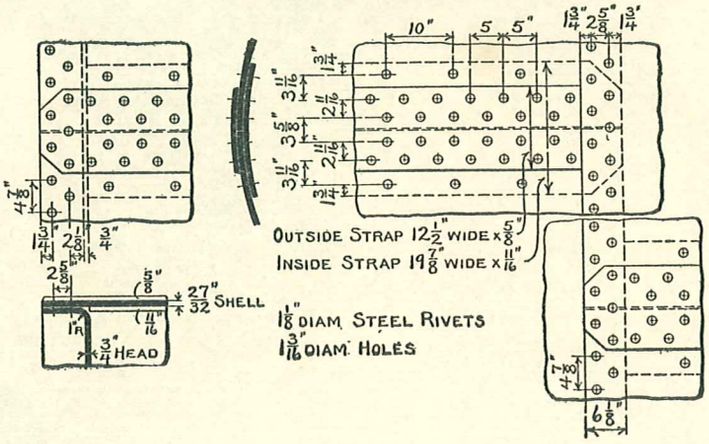
PLAN OF RIVETING.

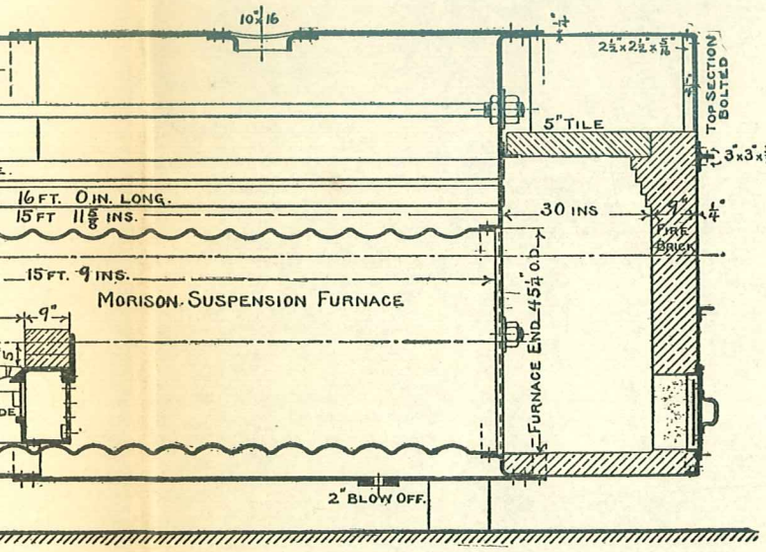


200 LBS. STEAM PRESSURE.

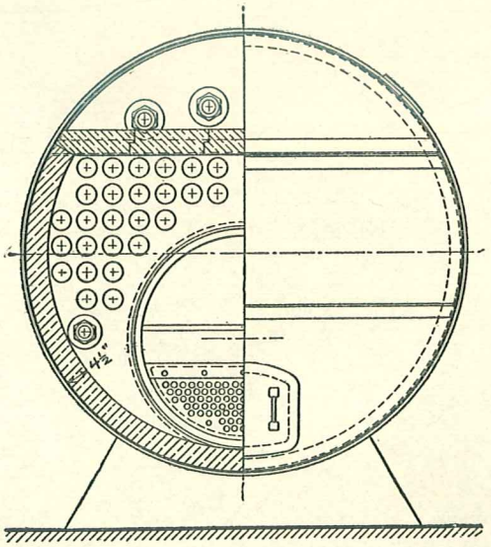
LENGTH OF BOILER OVER ALL ——— 19 FT. 9½ INS.
THICKNESS OF SHELL ——— 27/32 IN.
THICKNESS OF HEADS ——— ¾ IN.
THICKNESS OF MORISON FURNACE ——— 9/16 IN
DIAMETER OF STEEL THROUGH BOLTS ——— 2¼ INS.
DIAMETER OF THREADED BOLT ENDS ——— 3⅛ INS.

PLAN OF RIVETING.





INAL SECTIONAL ELEVATION.



SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.

AWING NO. 6.

DESIGN OF

150 H. P. BOILER,

TYPE A.

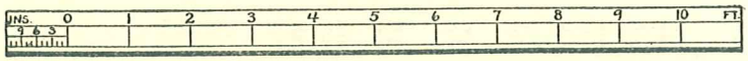
INTERNAL FURNACE BOILER OF 150 H

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW Y

1912.

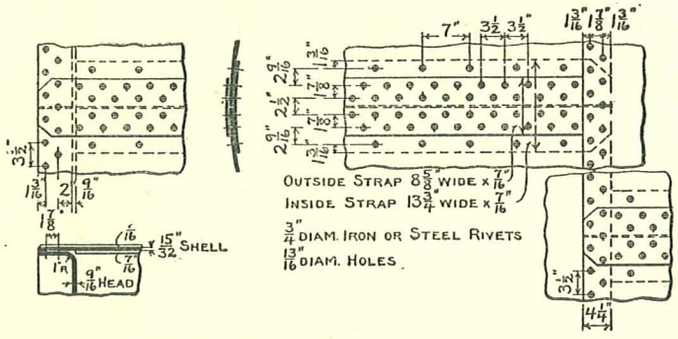
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL —— 16 FT 8 INS.
THICKNESS OF SHELL —— $\frac{15}{32}$ IN.
THICKNESS OF HEADS —— $\frac{9}{16}$ IN
THICKNESS OF MORISON FURNACE —— $\frac{11}{32}$ IN.
DIAMETER OF STEEL THROUGH BOLTS —— 2 INS.
DIAMETER OF THREADED BOLT ENDS —— $2\frac{3}{8}$ INS.

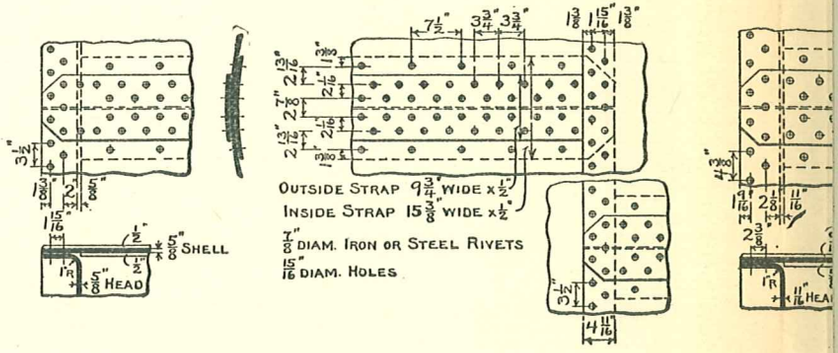
PLAN OF RIVETING.

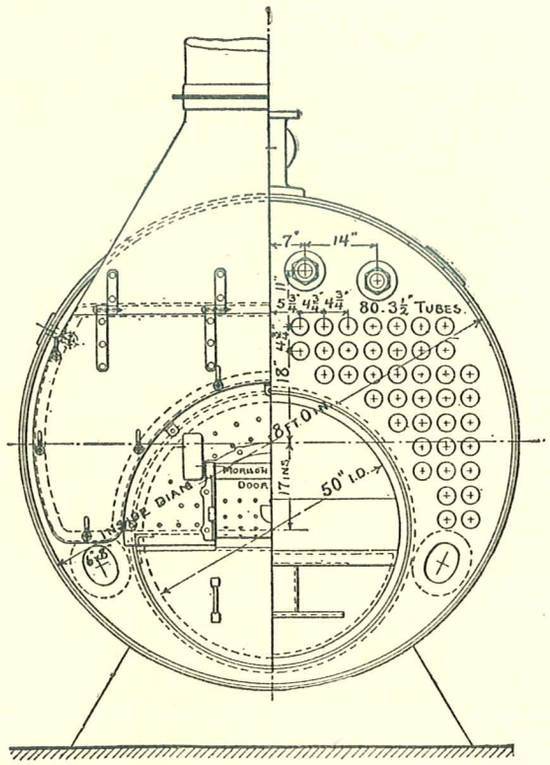


130 LBS. STEAM PRESSURE.

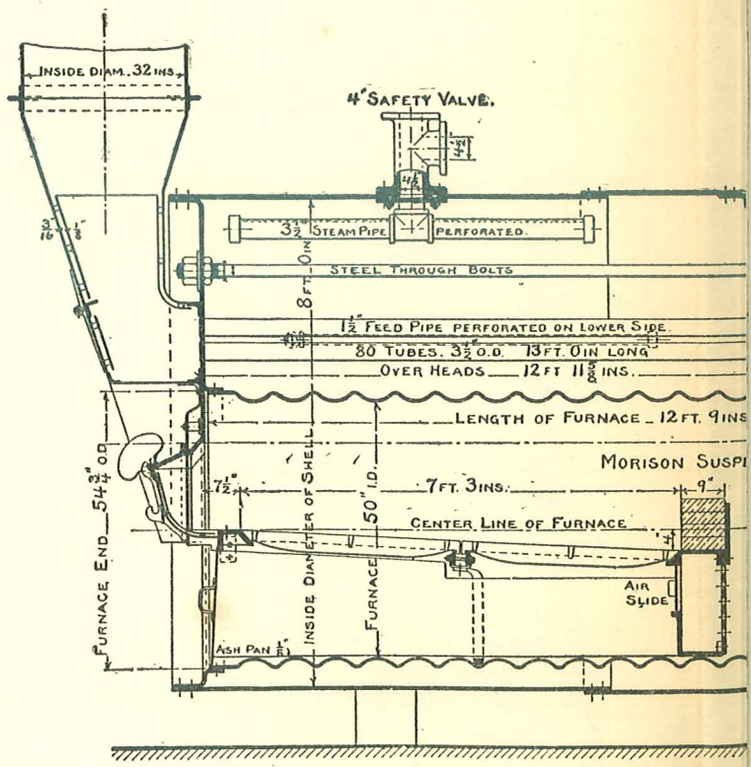
LENGTH OF BOILER OVER ALL —— 16 FT $8\frac{1}{4}$ INS.
THICKNESS OF SHELL —— $\frac{1}{2}$ IN.
THICKNESS OF HEADS —— $\frac{9}{16}$ IN.
THICKNESS OF MORISON FURNACE —— $\frac{7}{16}$ IN
DIAMETER OF STEEL THROUGH BOLTS —— $2\frac{1}{4}$ INS.
DIAMETER OF THREADED BOLT ENDS —— $2\frac{3}{8}$ INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONAL

DRAWING NO. 7.

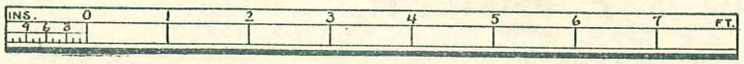
OF 150 HORSE POWER. TYPE A.

SIGNED BY

KS, NEW YORK (BOROUGH OF BROOKLYN.)

1912.

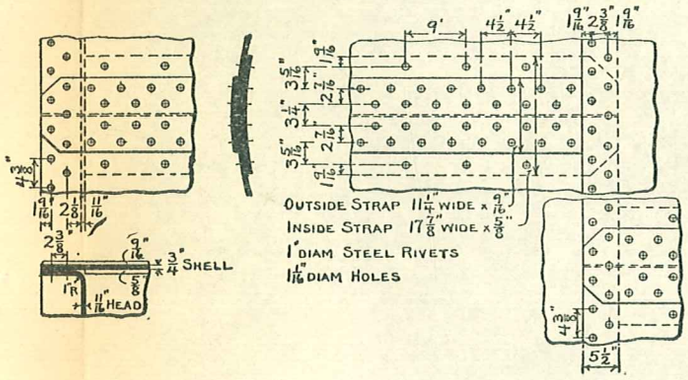
SCALE FOR RIVETING PLANS.



160 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	16 FT. 9 INS.
THICKNESS OF SHELL	$\frac{3}{4}$ IN
THICKNESS OF HEADS	$\frac{11}{16}$ IN
THICKNESS OF MORISON FURNACE	$\frac{9}{16}$ IN
DIAMETER OF STEEL THROUGH BOLTS	$2\frac{1}{2}$ INS.
DIAMETER OF THREADED BOLT ENDS	$2\frac{7}{8}$ INS

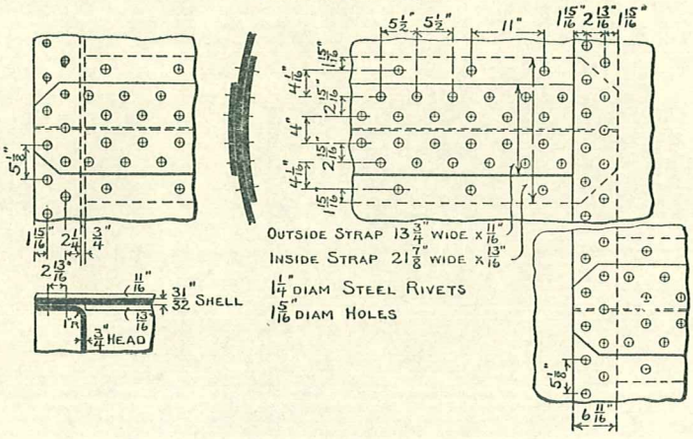
PLAN OF RIVETING.

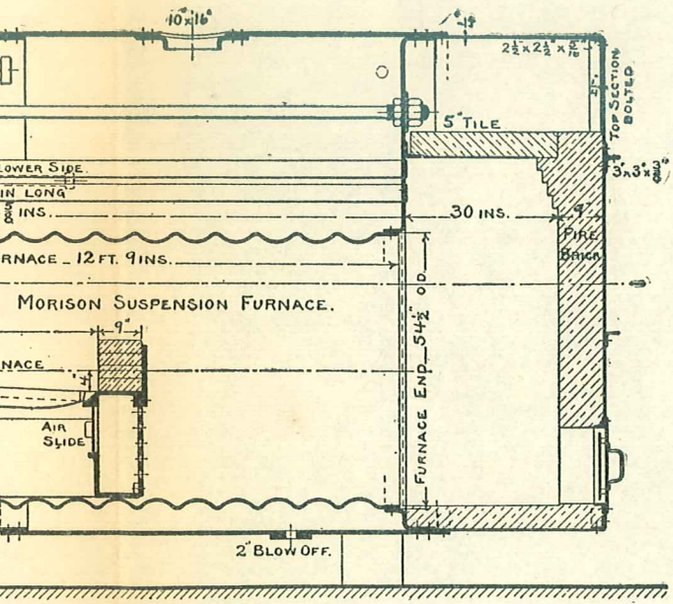


200 LBS. STEAM PRESSURE.

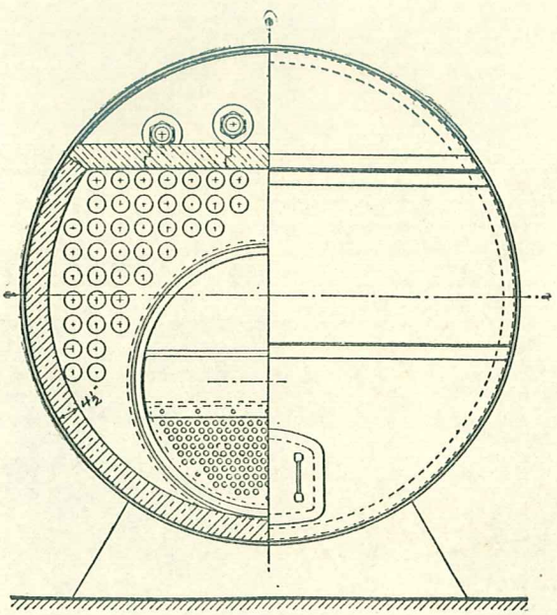
LENGTH OF BOILER OVER ALL	16 FT 10 INS.
THICKNESS OF SHELL	$\frac{31}{32}$ IN
THICKNESS OF HEADS	$\frac{3}{4}$ IN
THICKNESS OF MORISON FURNACE	$\frac{11}{16}$ IN
DIAMETER OF STEEL THROUGH BOLTS	$2\frac{3}{4}$ INS
DIAMETER OF THREADED BOLT ENDS	$3\frac{1}{8}$ INS.

PLAN OF RIVETING.



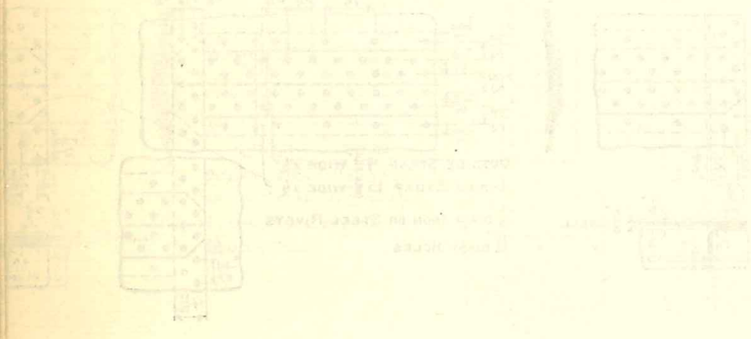


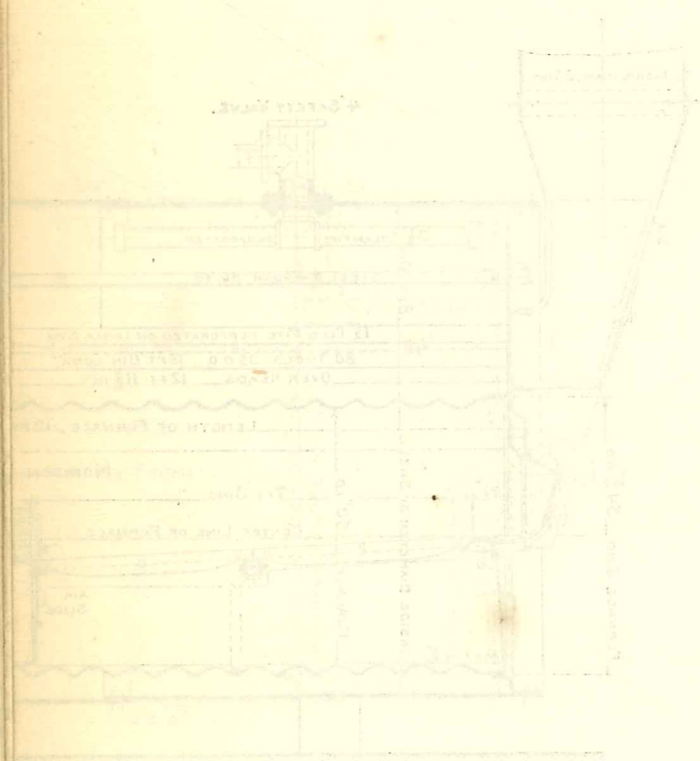
AL SECTIONAL ELEVATION.

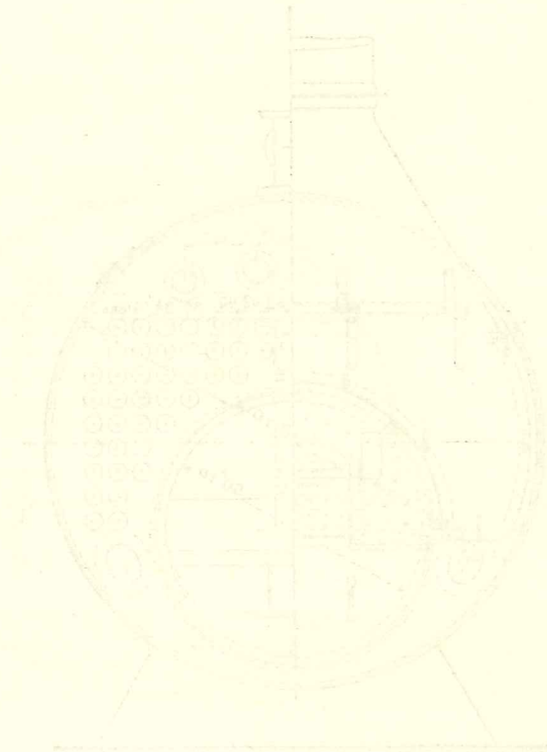


SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.

WING No. 7.







DESIGN OF

150 H. P. BOILER,

TYPE B.

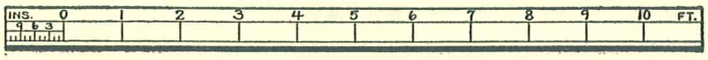
INTERNAL FURNACE BOILER OF 150 HORSE

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW YORK (Bo

1912.

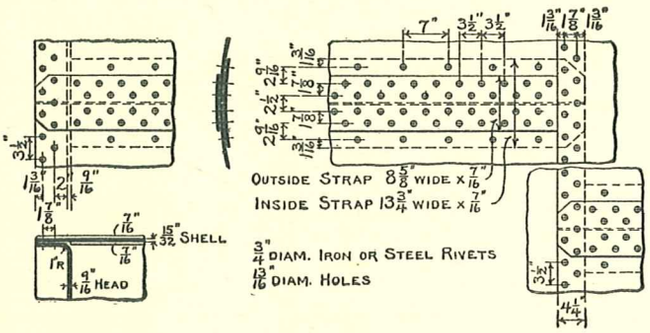
Scale for Boiler Elevations.



100 lbs. Steam Pressure.

Length of Boiler over all	19 ft. 8 ins.
Thickness of Shell	$\frac{15}{32}$ in.
Thickness of Heads	$\frac{9}{16}$ in.
Thickness of Morison Furnace	$\frac{9}{16}$ in.
Diameter of Steel Through Bolts	2 ins.
Diameter of Threaded Bolt Ends	$2\frac{3}{8}$ ins.

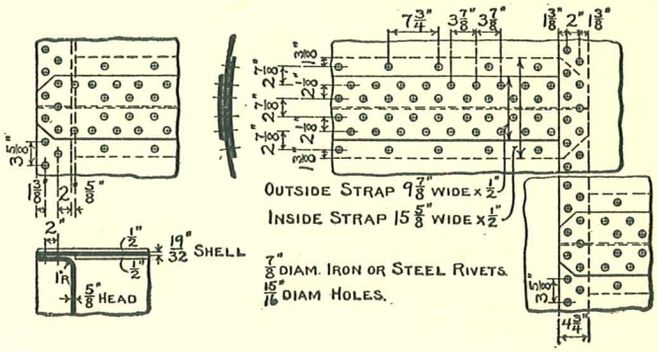
Plan of Riveting.

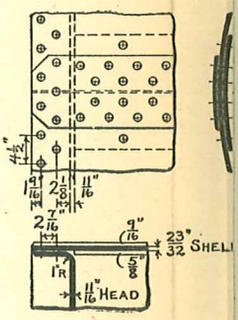


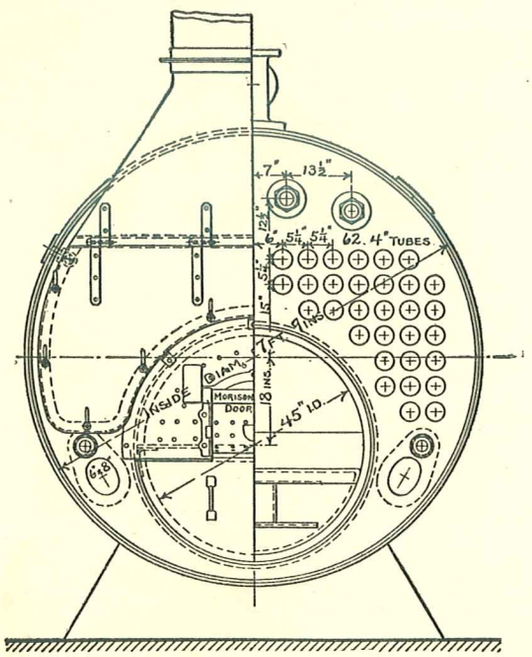
130 lbs. Steam Pressure.

Length of Boiler over all	19 ft. 8¼ ins.
Thickness of Shell	$\frac{19}{32}$ in.
Thickness of Heads	$\frac{5}{8}$ in.
Thickness of Morison Furnace	$\frac{19}{32}$ in.
Diameter of Steel Through Bolts	2¼ ins.
Diameter of Threaded Bolt Ends	$2\frac{5}{8}$ ins.

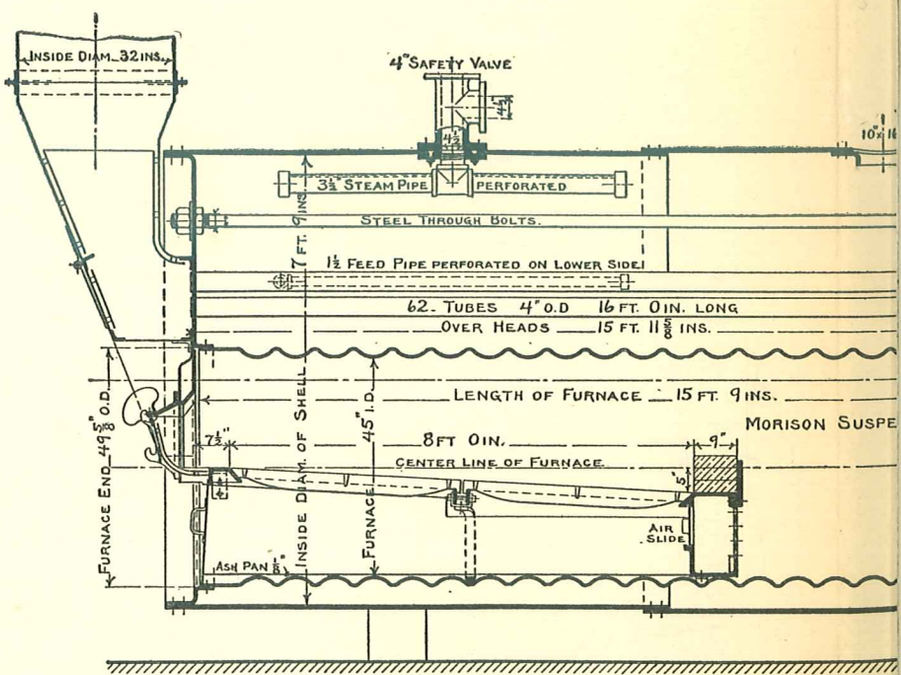
Plan of Riveting.







Front Exterior Elevation.



Longitudinal Sectional Elevat

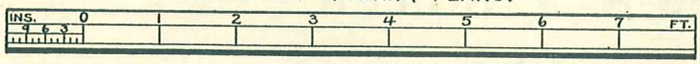
DRAWING No. 8.

50 Horse Power. Type B.

BY

EW YORK (BOROUGH OF BROOKLYN.)

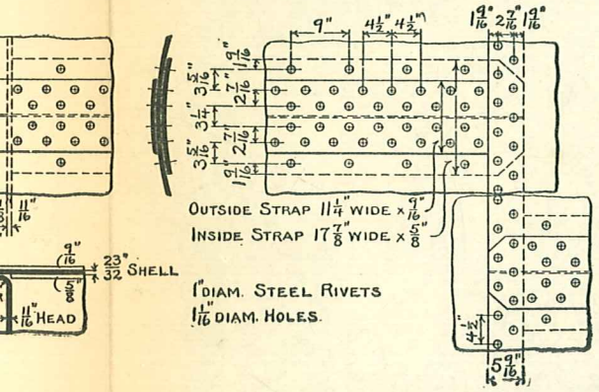
Scale for Riveting Plans.



160 Lbs. Steam Pressure.

Length of Boiler over all ——— 19 ft. 9 ins.
Thickness of Shell ——— $\frac{23}{32}$ in.
Thickness of Heads ——— $\frac{11}{16}$ in.
Thickness of Morison Furnace ——— $\frac{1}{2}$ in.
Diameter of Steel Through Bolts ——— $2\frac{1}{2}$ ins.
Diameter of Threaded Bolt Ends ——— $2\frac{7}{8}$ ins.

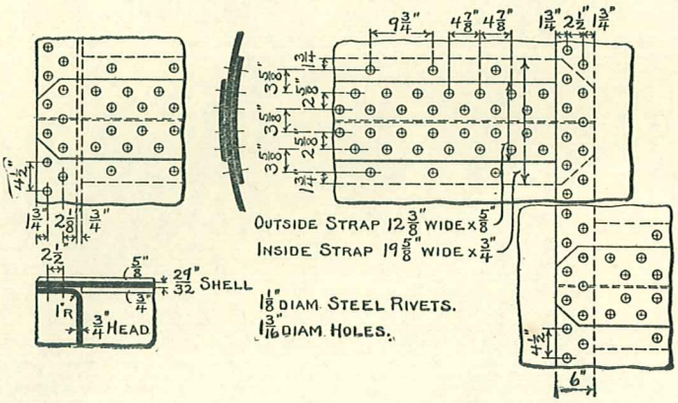
Plan of Riveting.

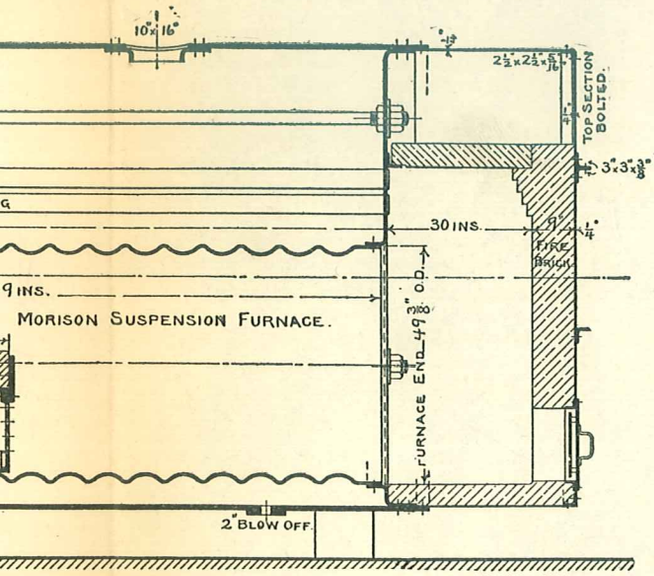


200 Lbs. Steam Pressure.

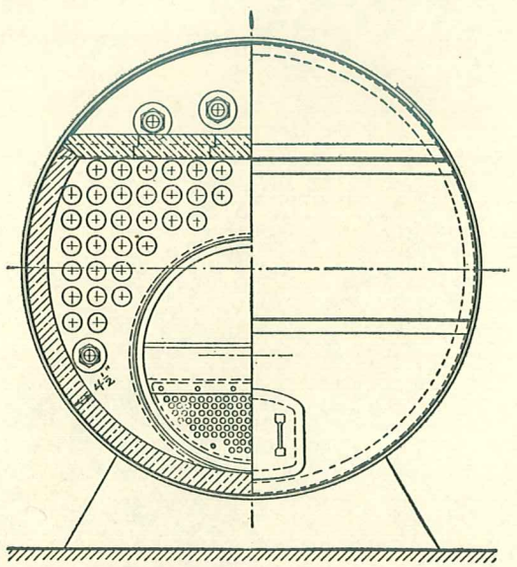
Length of Boiler over all ——— 19 ft. 9¼ ins.
Thickness of Shell ——— $\frac{29}{32}$ in.
Thickness of Heads ——— $\frac{3}{4}$ in.
Thickness of Morison Furnace ——— $\frac{5}{8}$ in.
Diameter of Steel Through Bolts ——— $2\frac{3}{4}$ ins.
Diameter of Threaded Bolt Ends ——— $3\frac{1}{8}$ ins.

Plan of Riveting.

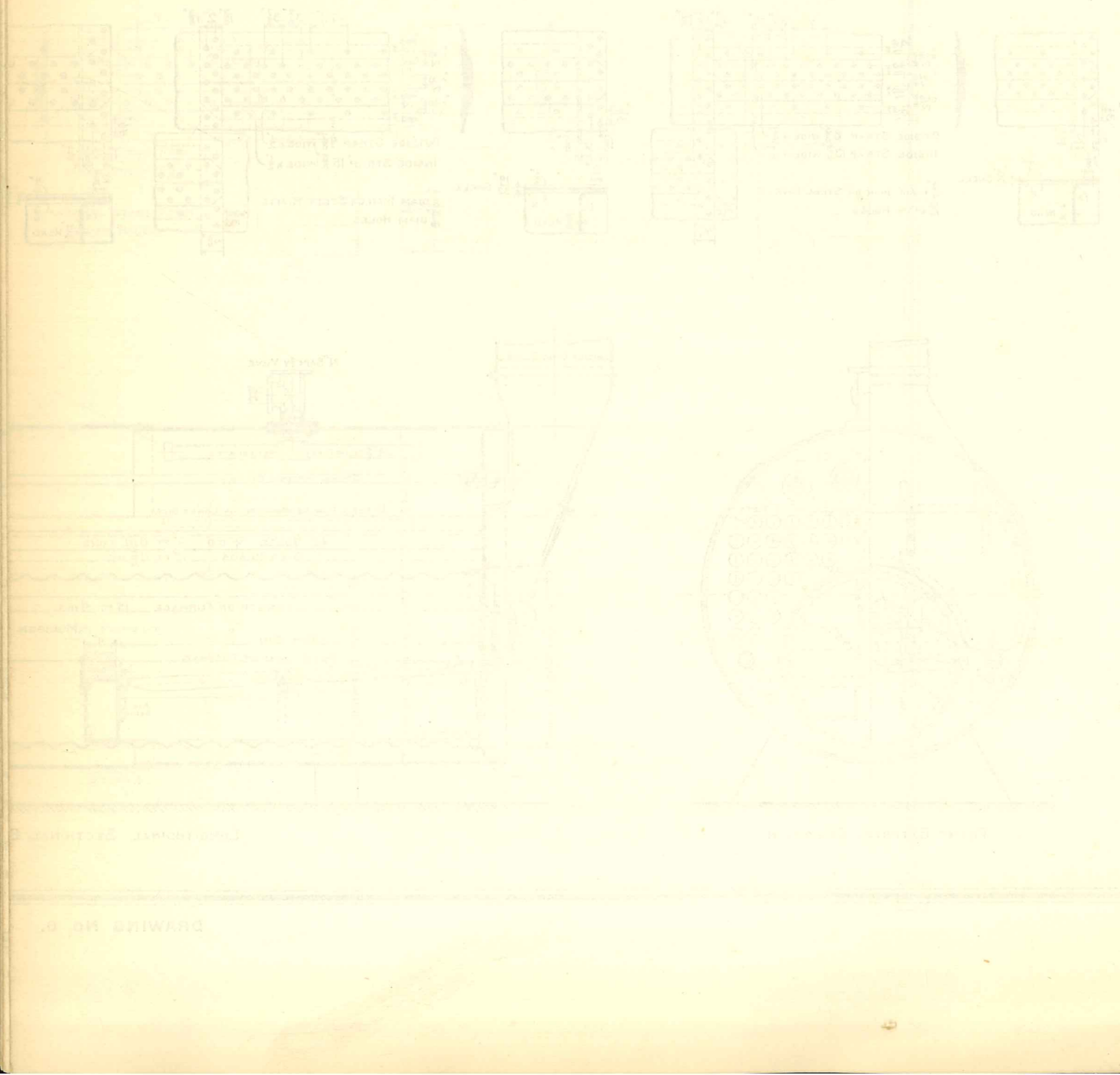




ctional Elevation.



Sectional Elevation Rear Exterior Elevation.



DESIGN OF

200 H. P. BOILER,

TYPE A.

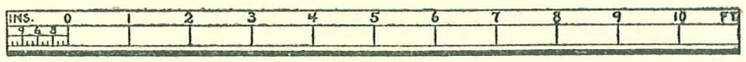
INTERNAL FURNACE BOILER OF 200

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW Y

1912.

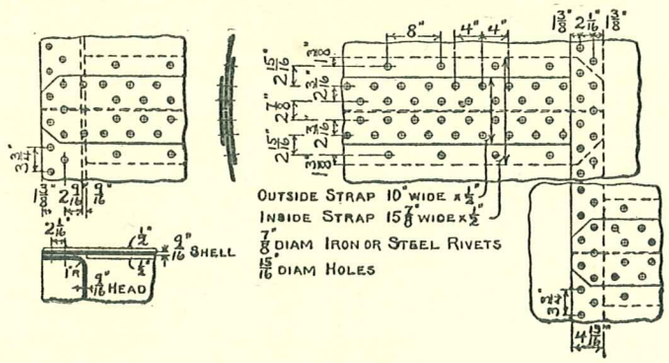
SCALE FOR BOILER ELEVATIONS.



100 LBS STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	16 FT 3 INS
THICKNESS OF SHELL	$\frac{9}{16}$ IN
THICKNESS OF HEADS	$\frac{9}{16}$ IN
THICKNESS OF MORISON FURNACES	$\frac{5}{16}$ IN
DIAMETER OF STEEL THROUGH BOLTS	2 INS
DIAMETER OF THREADED BOLT ENDS	$2\frac{3}{8}$ INS

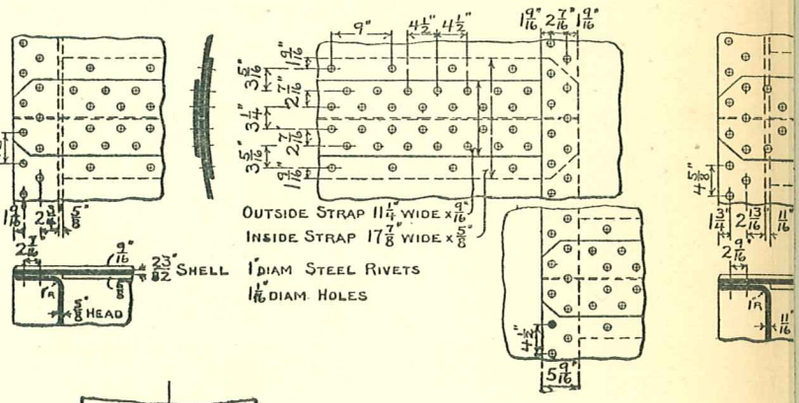
PLAN OF RIVETING.

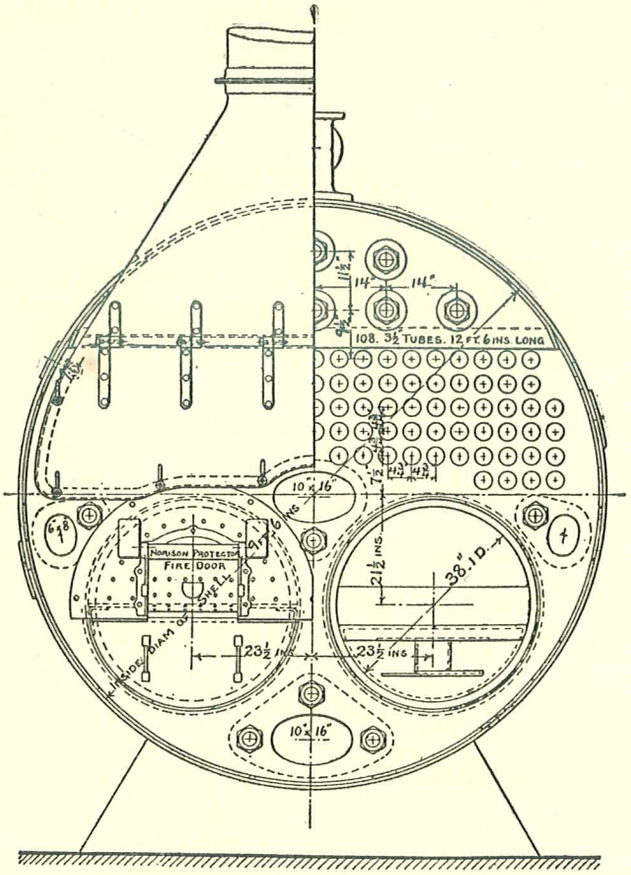


130 LBS. STEAM PRESSURE.

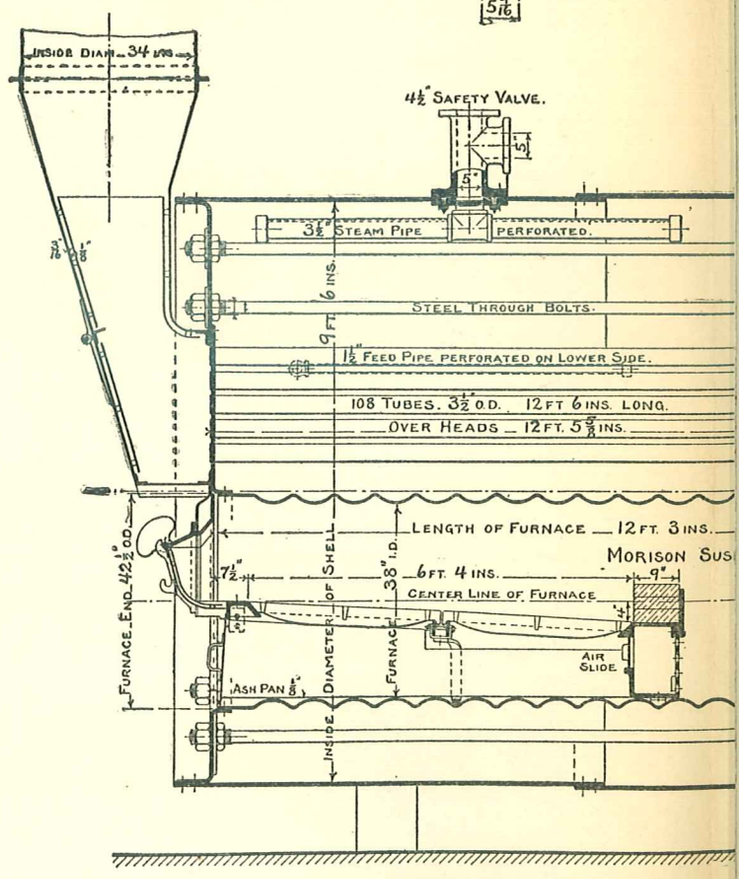
LENGTH OF BOILER OVER ALL	16 FT $3\frac{3}{4}$ INS
THICKNESS OF SHELL	$\frac{23}{32}$ IN
THICKNESS OF HEADS	$\frac{5}{8}$ IN
THICKNESS OF MORISON FURNACES	$\frac{11}{32}$ IN
DIAMETER OF STEEL THROUGH BOLTS	$2\frac{1}{4}$ INS
DIAMETER OF THREADED BOLT ENDS	$2\frac{5}{8}$ INS

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONAL

DRAWING No. 9.

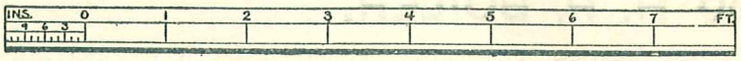
OF 200 HORSE POWER. TYPE A.

GNED BY

S, NEW YORK (BOROUGH OF BROOKLYN.)

912.

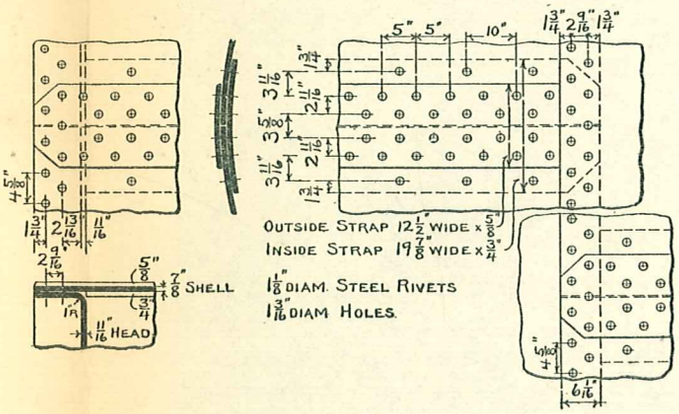
SCALE FOR RIVETING PLANS.



160 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	16 FT 4 INS
THICKNESS OF SHELL	7/16 IN
THICKNESS OF HEADS	11/16 IN.
THICKNESS OF MORISON FURNACES	7/16 IN
DIAMETER OF STEEL THROUGH BOLTS	2 1/2 INS
DIAMETER OF THREADED BOLT ENDS	2 7/8 INS

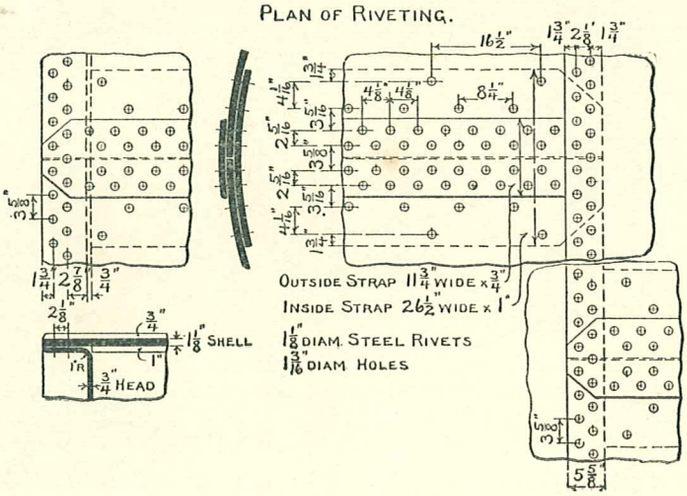
PLAN OF RIVETING.

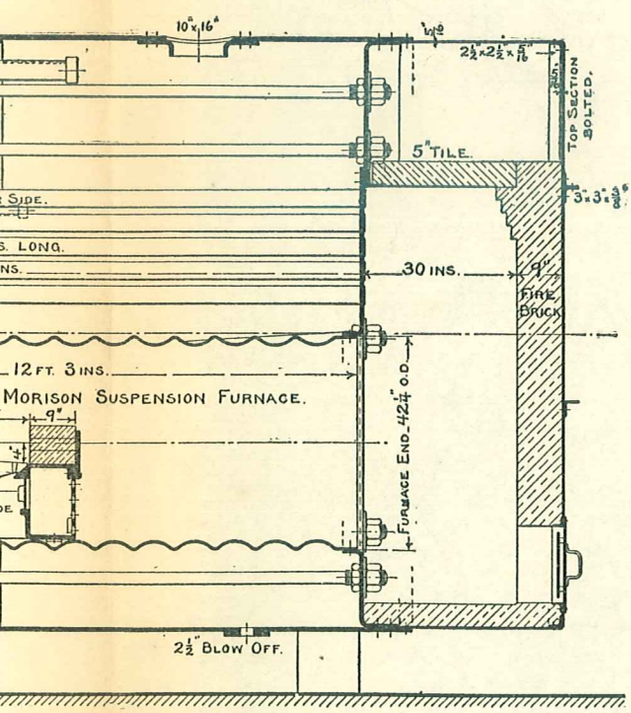


200 LBS. STEAM PRESSURE.

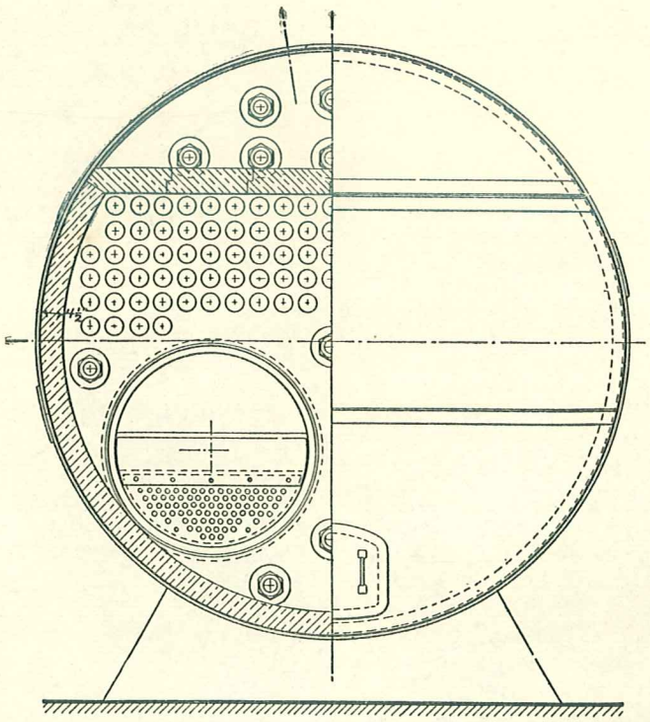
LENGTH OF BOILER OVER ALL	16 FT 3 3/4 INS
THICKNESS OF SHELL	1 1/8 INS
THICKNESS OF HEADS	3/4 IN
THICKNESS OF MORISON FURNACES	17/32 IN
DIAMETER OF STEEL THROUGH BOLTS	2 3/4 INS
DIAMETER OF THREADED BOLT ENDS	3 1/8 INS

PLAN OF RIVETING.



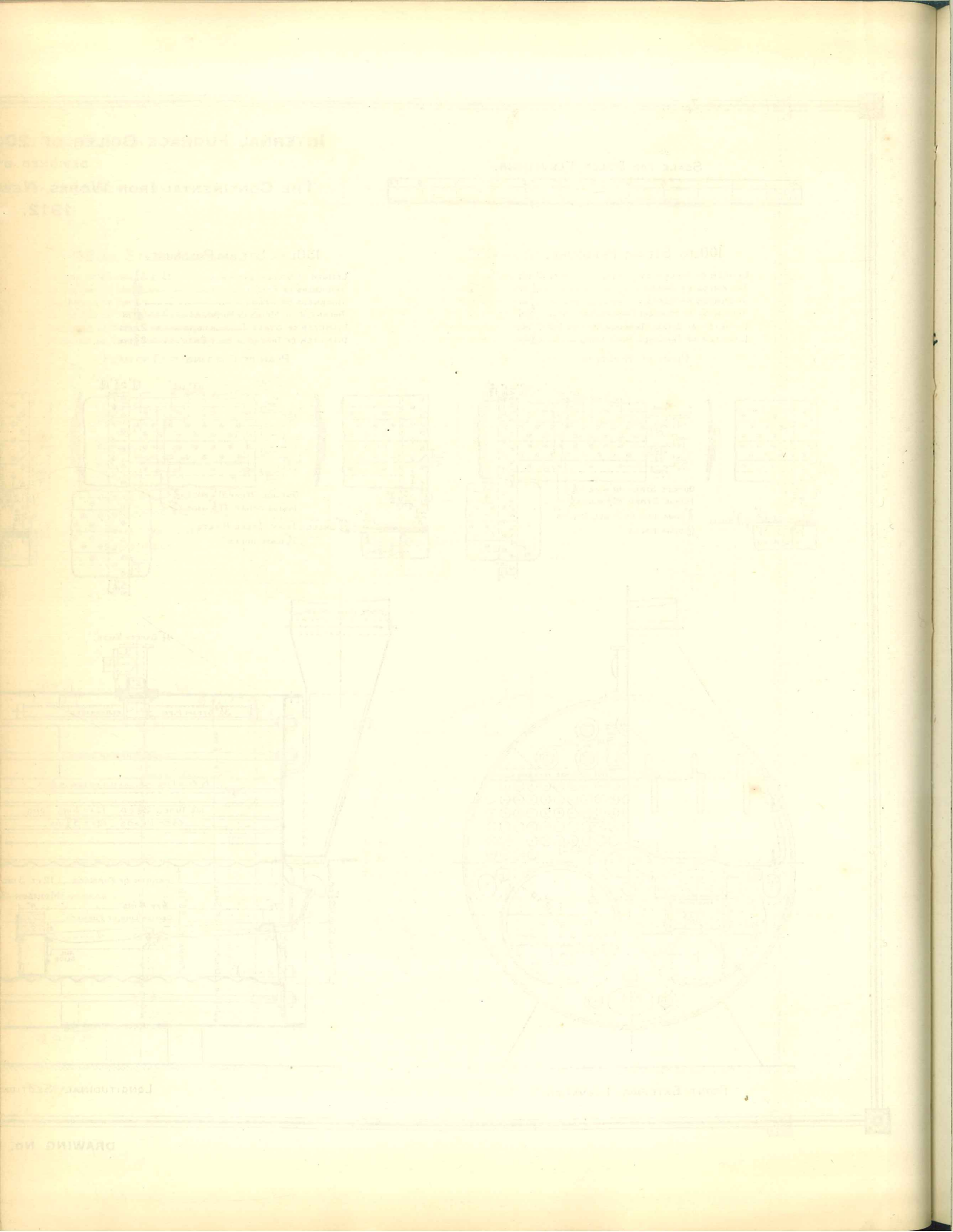


SECTIONAL ELEVATION.



SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.

NG No. 9.



DESIGN OF

200 H. P. BOILER,

TYPE B.

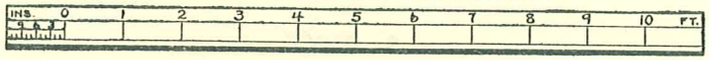
INTERNAL FURNACE BOILER OF 200 HORSE

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW YORK (B

1912.

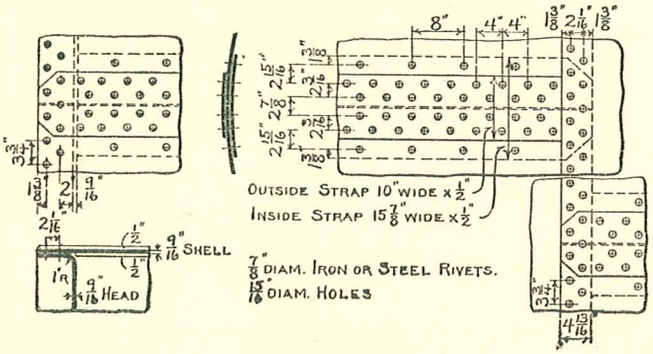
SCALE FOR BOILER ELEVATIONS.



100 LBS STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	19 FT. 8½ INS.
THICKNESS OF SHELL	9/16 IN.
THICKNESS OF HEADS	9/16 IN.
THICKNESS OF MORISON FURNACES	5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS	2 INS.
DIAMETER OF THREADED BOLT ENDS	2 3/8 INS.

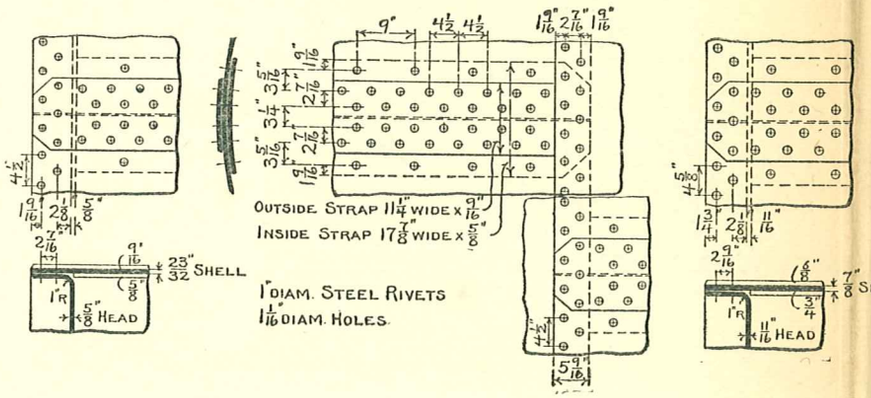
PLAN OF RIVETING.

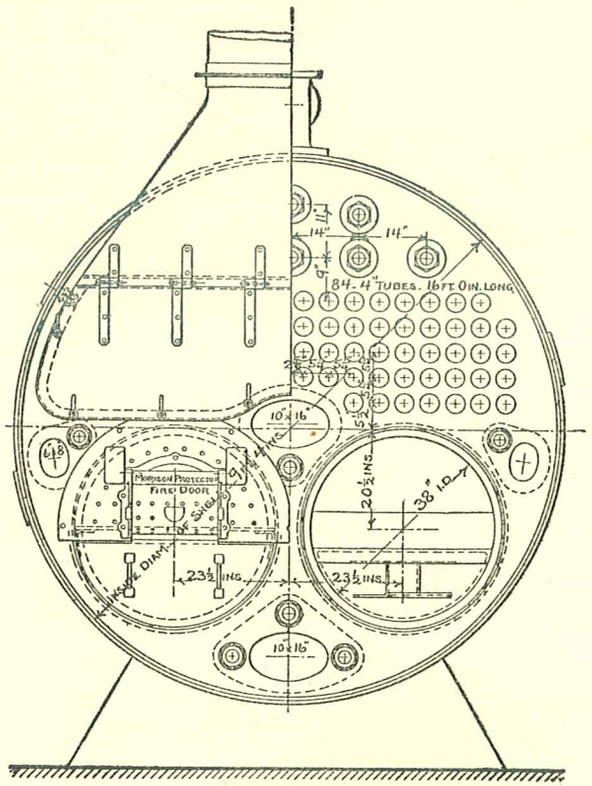


130 LBS. STEAM PRESSURE.

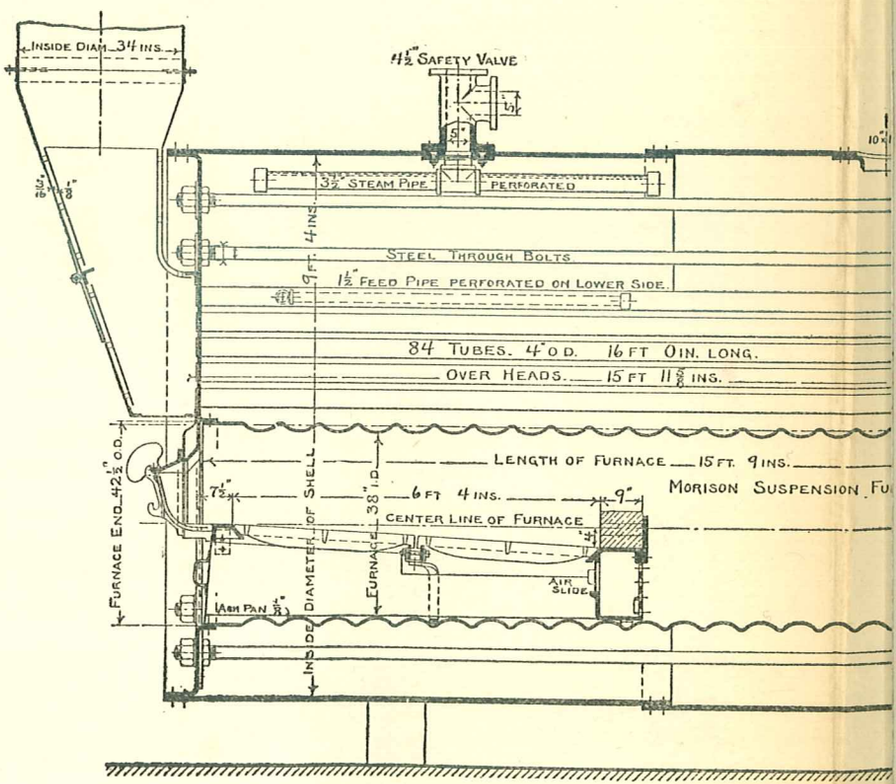
LENGTH OF BOILER OVER ALL	19 FT 9 INS
THICKNESS OF SHELL	23/32 IN
THICKNESS OF HEADS	23/32 IN
THICKNESS OF MORISON FURNACES	5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS	2 1/16 INS
DIAMETER OF THREADED BOLT ENDS	2 INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONAL ELEVAT

DRAWING No. 10.

200 Horse Power. Type B.

D BY

EW YORK (BOROUGH OF BROOKLYN.)

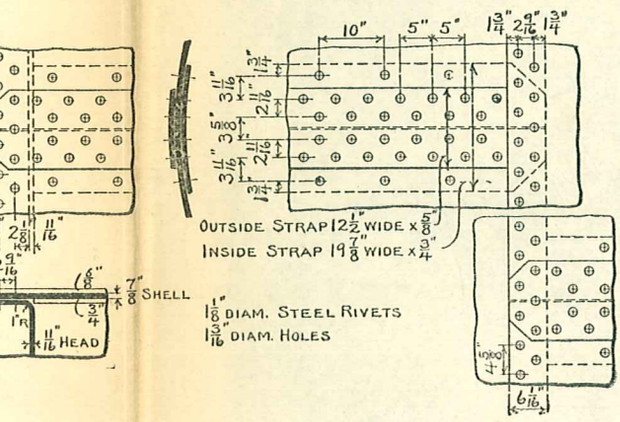
.

Scale for Riveting Plans.

160 lbs. Steam Pressure.

Length of Boiler over all	19 ft. 9½ ins.
Thickness of Shell	⅞ in.
Thickness of Heads	11/16 in.
Thickness of Morison Furnaces	7/16 in.
Diameter of Steel Through Bolts	2½ ins.
Diameter of Threaded Bolt Ends	2⅞ ins.

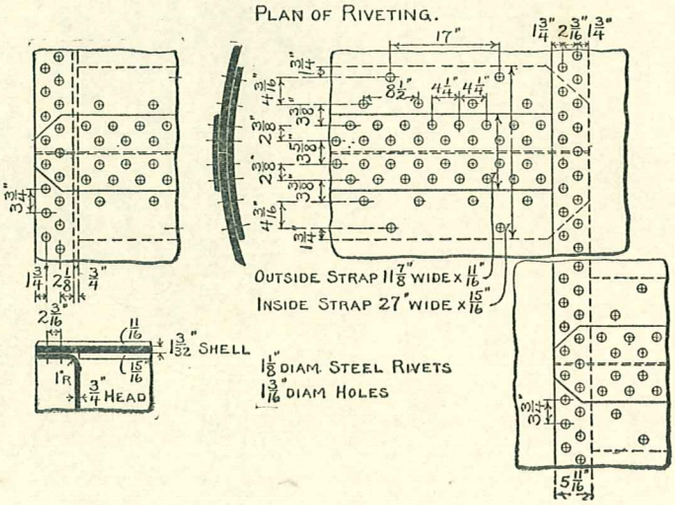
Plan of Riveting.

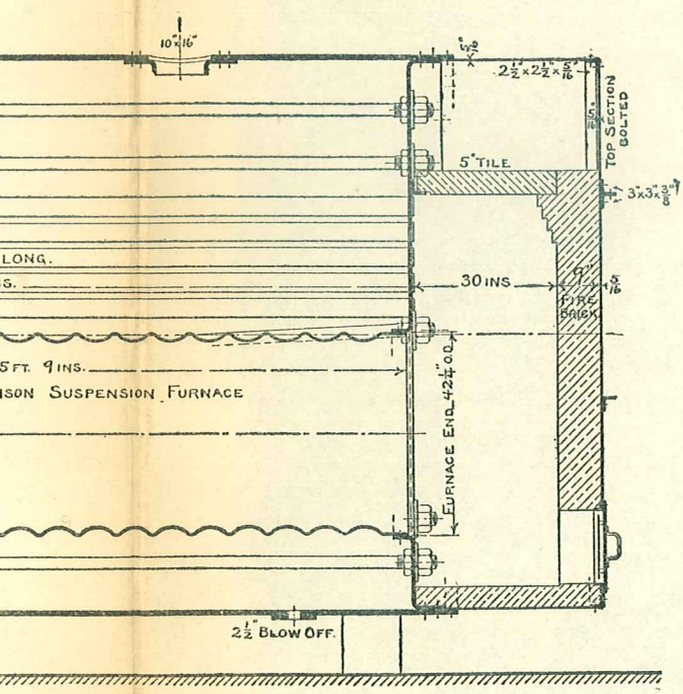


200 lbs. Steam Pressure.

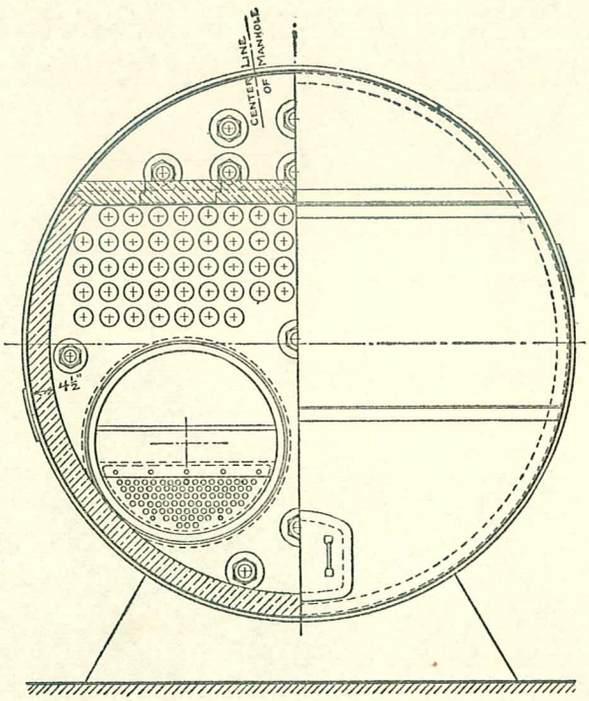
Length of Boiler over all	19 ft. 9 ins.
Thickness of Shell	13/32 ins.
Thickness of Heads	¾ in.
Thickness of Morison Furnaces	7/16 in.
Diameter of Steel Through Bolts	2⅞ ins.
Diameter of Threaded Bolt Ends	3⅛ ins.

Plan of Riveting.



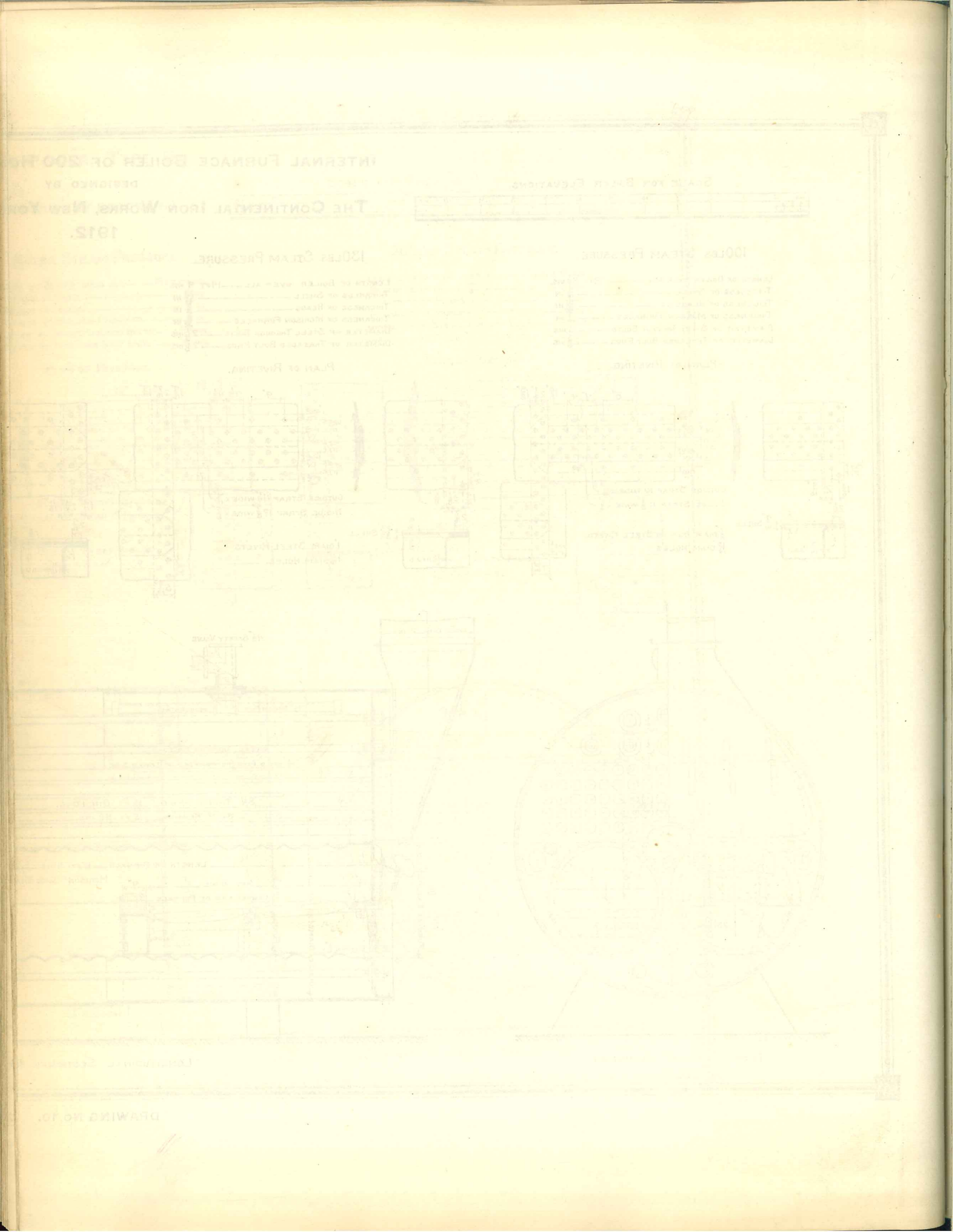


Sectional Elevation.



Sectional Elevation. Rear Exterior Elevation.

G No. 10.



DESIGN OF

250 H. P. BOILER,

TYPE A.

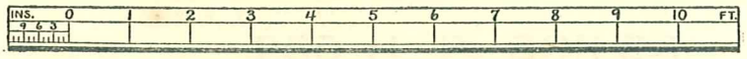
INTERNAL FURNACE BOILER OF 250 I

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW Y

1912.

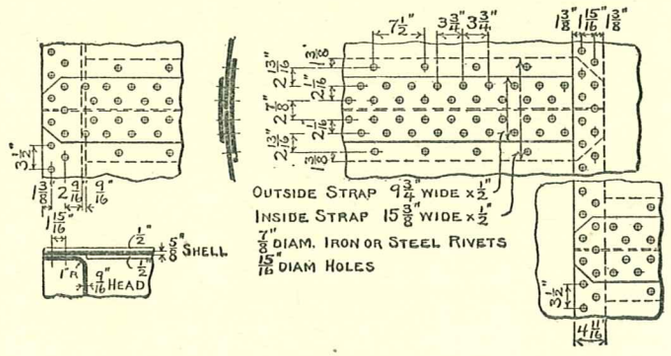
SCALE FOR BOILER ELEVATIONS.



100 LBS STEAM PRESSURE.

LENGTH OF BOILER OVER ALL —— 16 FT. $2\frac{3}{4}$ INS.
THICKNESS OF SHELL —— $\frac{5}{8}$ IN.
THICKNESS OF HEADS —— $\frac{9}{16}$ IN.
THICKNESS OF MORISON FURNACES —— $\frac{5}{16}$ IN.
DIAMETER OF STEEL THROUGH BOLTS —— 2 INS.
DIAMETER OF THREADED BOLT ENDS —— $2\frac{3}{8}$ INS.

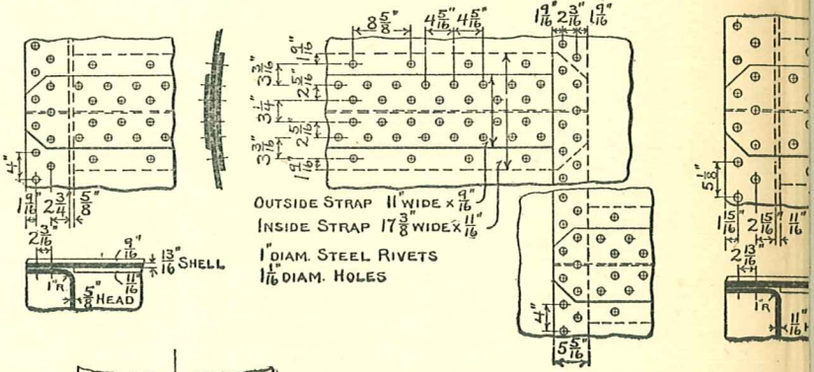
PLAN OF RIVETING.

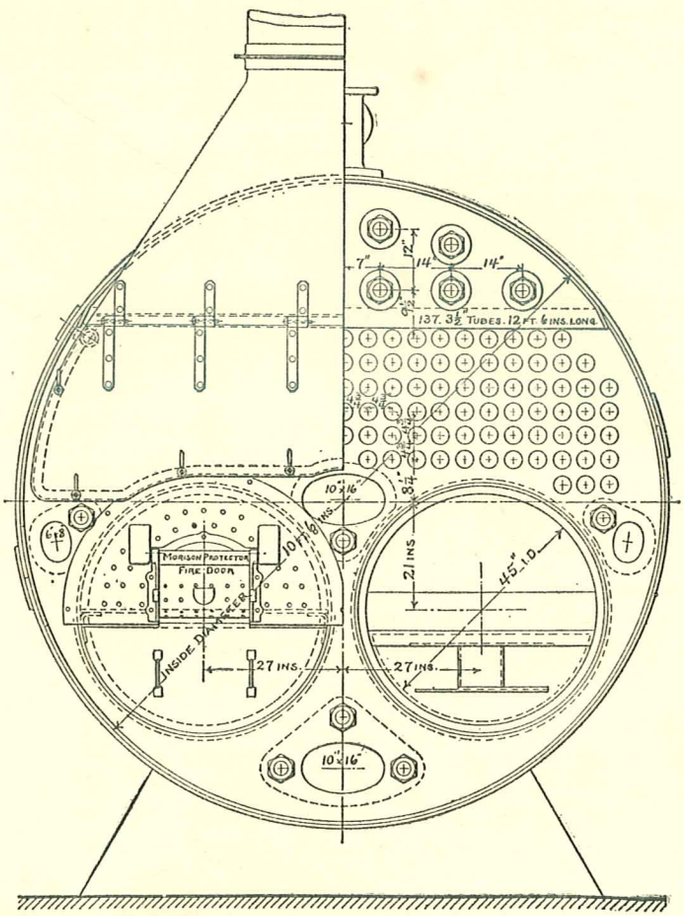


130 LBS. STEAM PRESSURE.

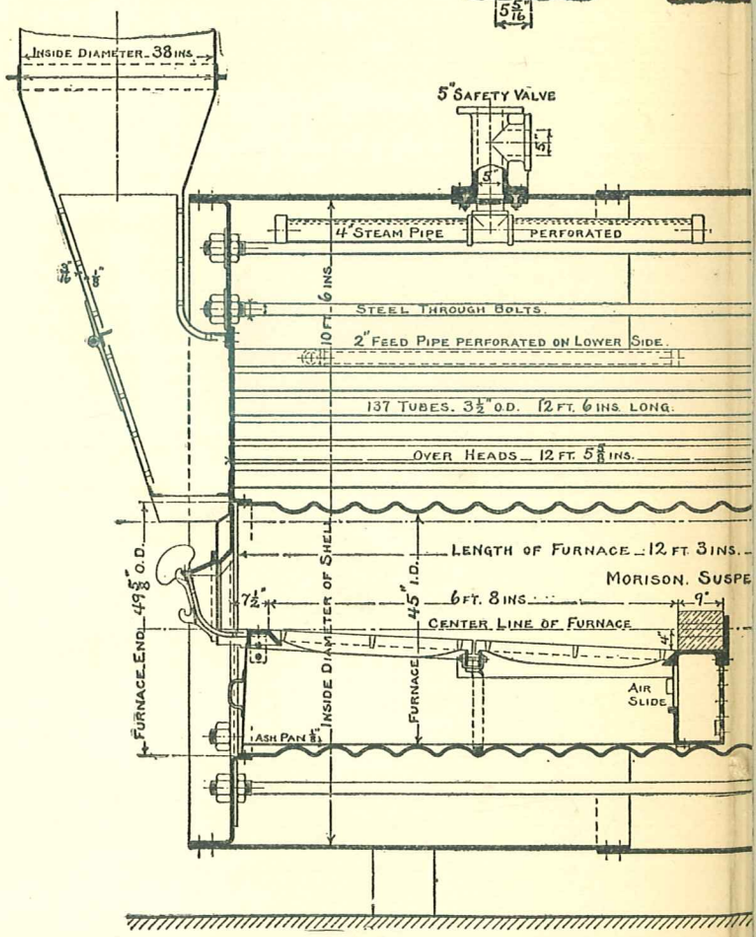
LENGTH OF BOILER OVER ALL —— 16 FT $3\frac{1}{2}$ INS
THICKNESS OF SHELL —— $\frac{13}{16}$ IN
THICKNESS OF HEADS —— $\frac{5}{8}$ IN.
THICKNESS OF MORISON FURNACES —— $\frac{13}{32}$ IN.
DIAMETER OF STEEL THROUGH BOLTS —— $2\frac{1}{4}$ INS.
DIAMETER OF THREADED BOLT ENDS —— $2\frac{5}{8}$ INS.

PLAN OF RIVETING





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONA

DRAWING No. 11.

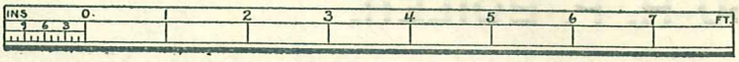
OF 250 HORSE POWER. TYPE A.

IGNED BY

LS, NEW YORK (BOROUGH OF BROOKLYN.)

1912.

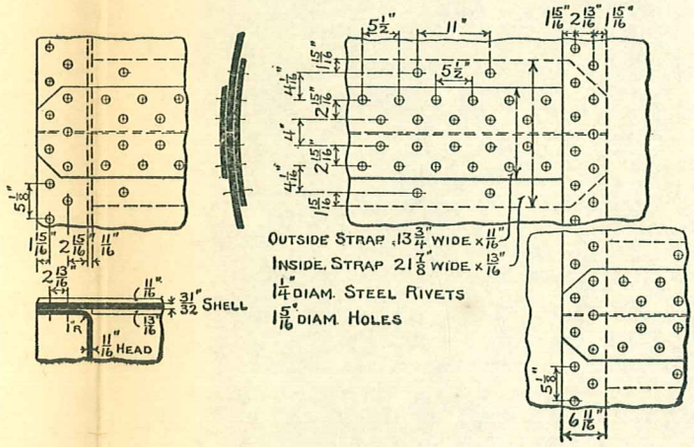
SCALE FOR RIVETING PLANS.



160 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	16 FT. 4 3/4 INS.
THICKNESS OF SHELL	31/32 IN.
THICKNESS OF HEADS	11/16 IN.
THICKNESS OF MORISON FURNACES	1/2 IN
DIAMETER OF STEEL THROUGH BOLTS	2 1/2 INS.
DIAMETER OF THREADED BOLT ENDS	2 7/8 INS.

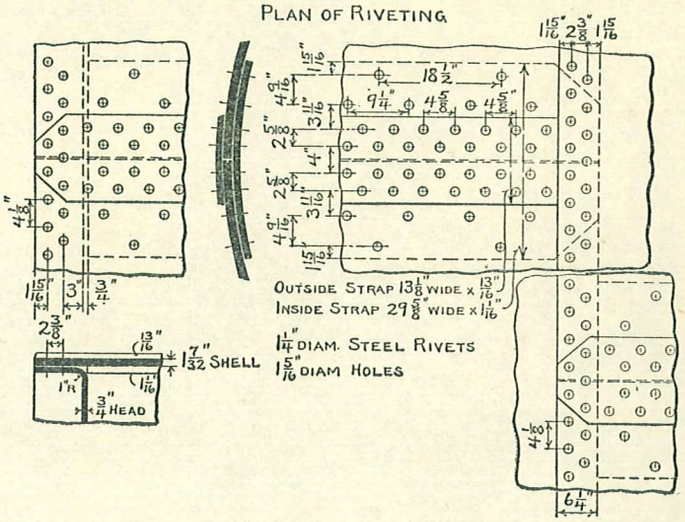
PLAN OF RIVETING.

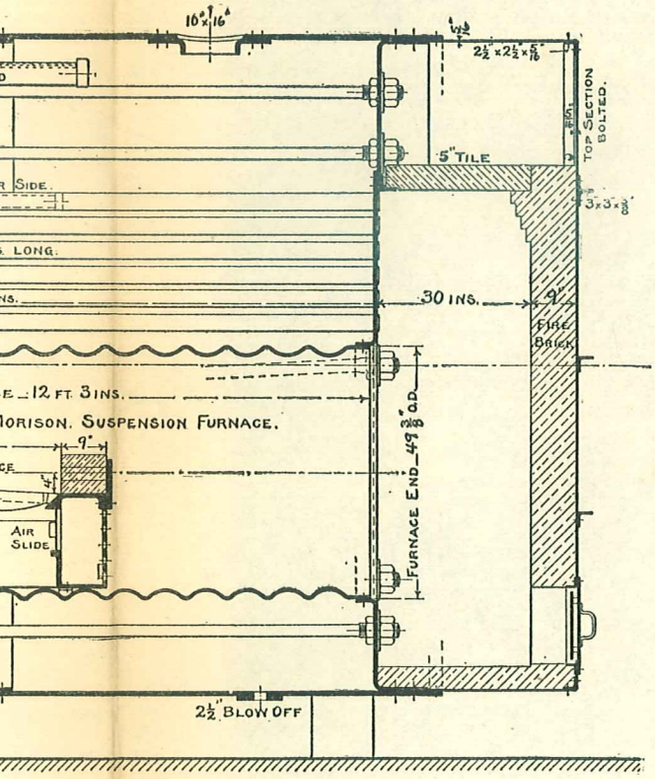


200 LBS. STEAM PRESSURE.

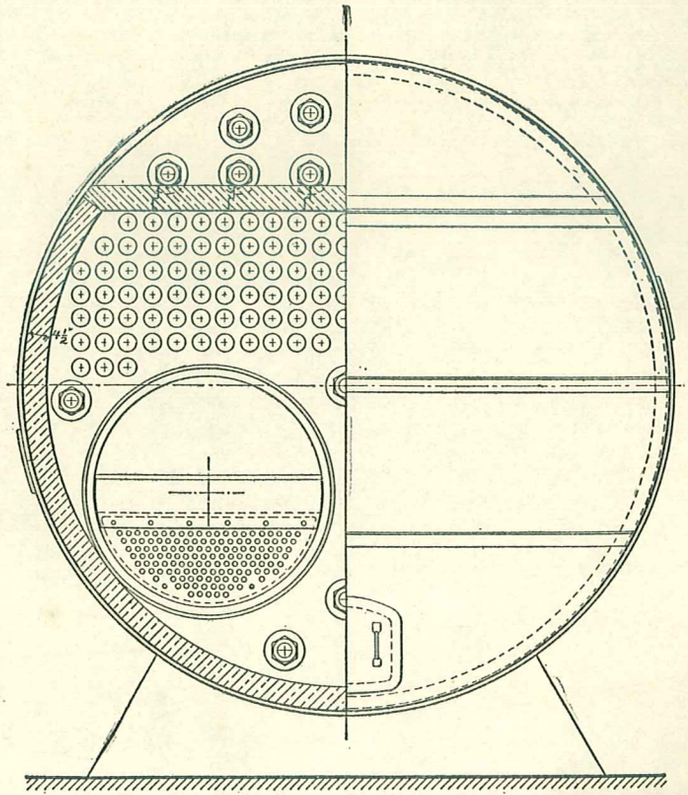
LENGTH OF BOILER OVER ALL	16 FT 4 1/4 INS.
THICKNESS OF SHELL	1 7/32 INS
THICKNESS OF HEADS	3/4 IN.
THICKNESS OF MORISON FURNACES	5/8 IN
DIAMETER OF STEEL THROUGH BOLTS	2 3/4 INS
DIAMETER OF THREADED BOLT ENDS	3 1/8 INS.

PLAN OF RIVETING



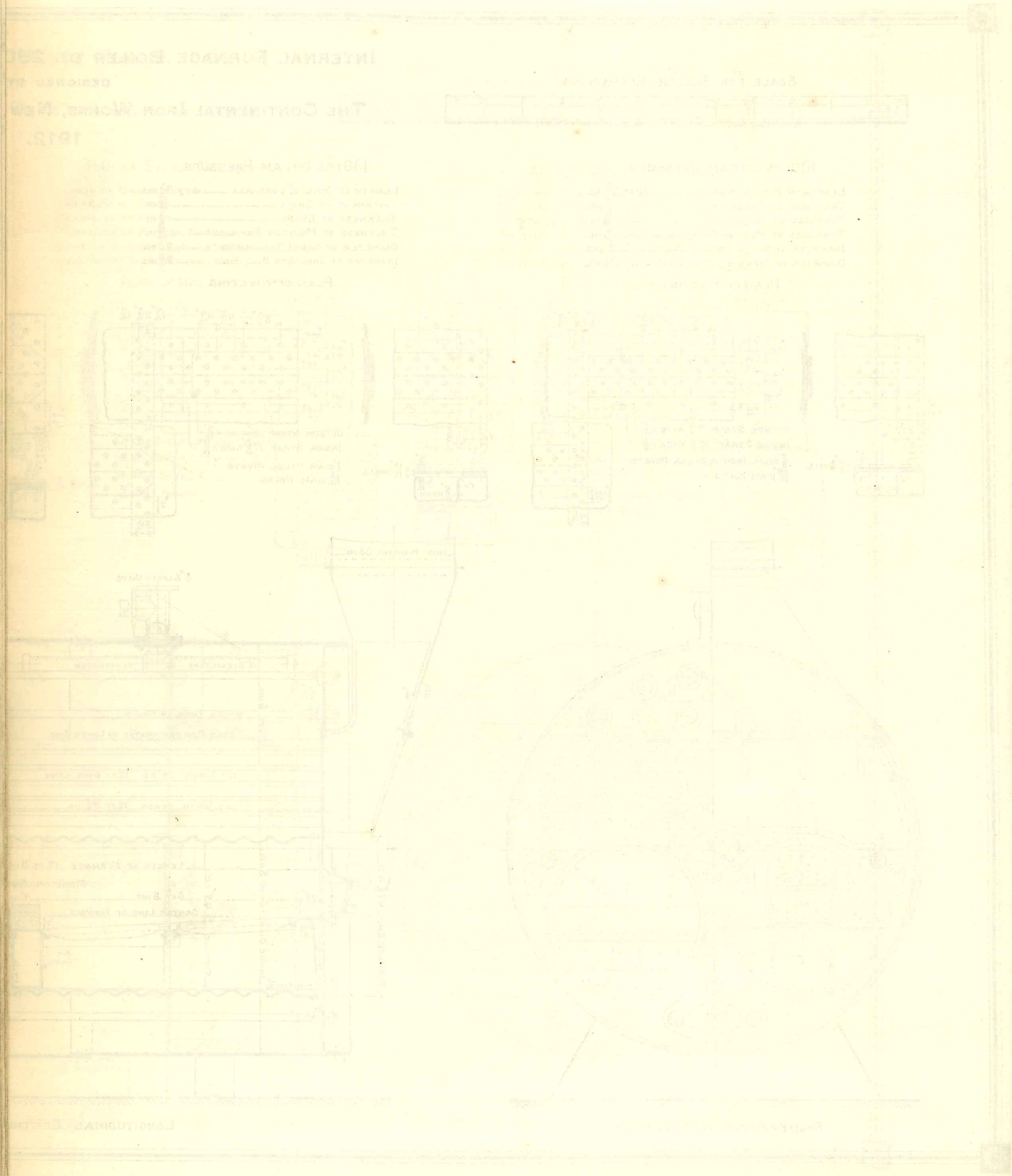


L. SECTIONAL ELEVATION.



SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.

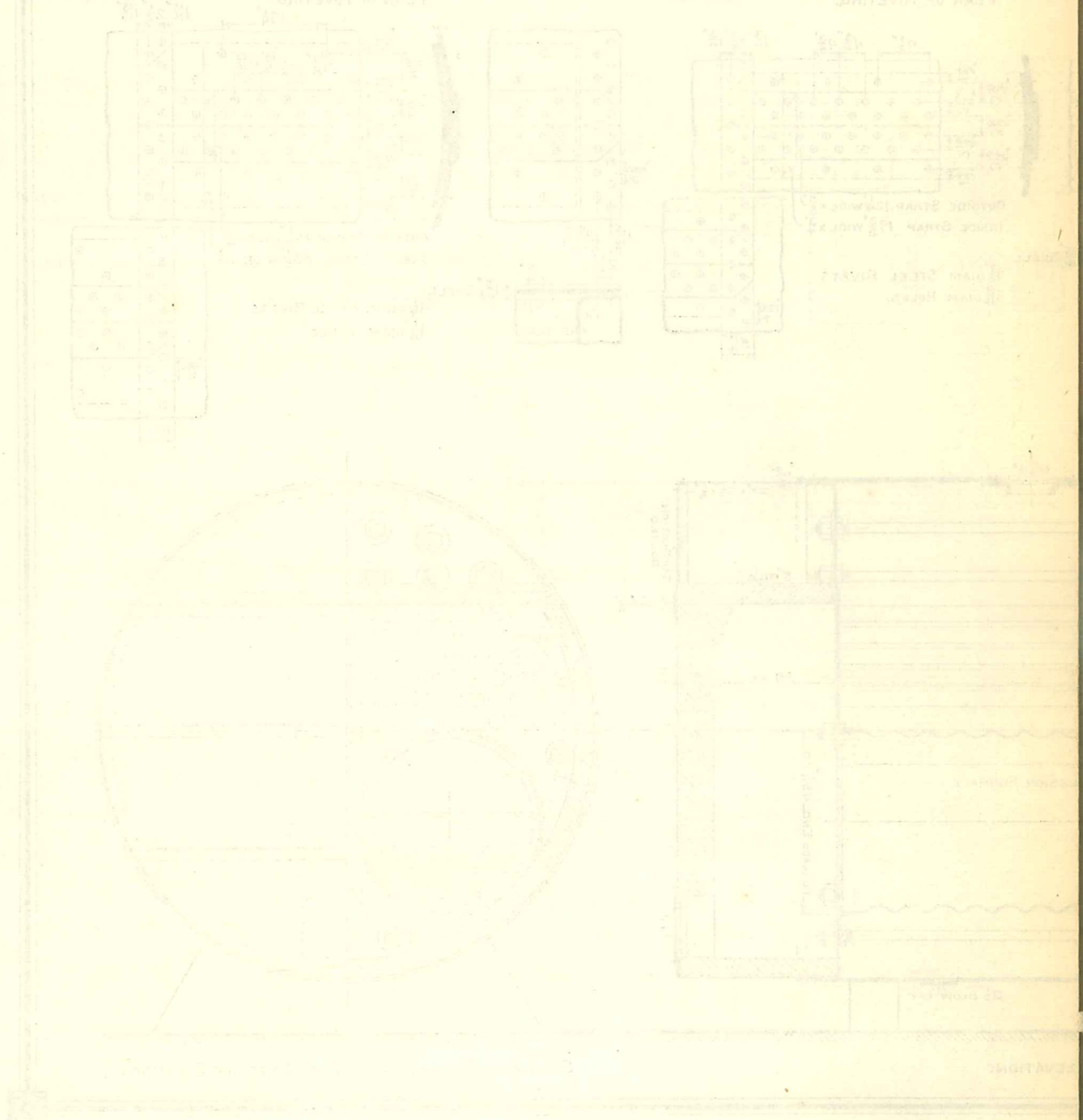
NG No. 11.



DESIGN OF

250 H. P. BOILER,

TYPE B.



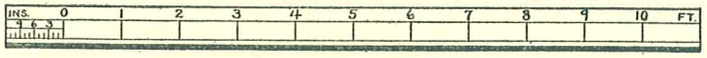
INTERNAL FURNACE BOILER OF 250 HOR

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW YORK

1912.

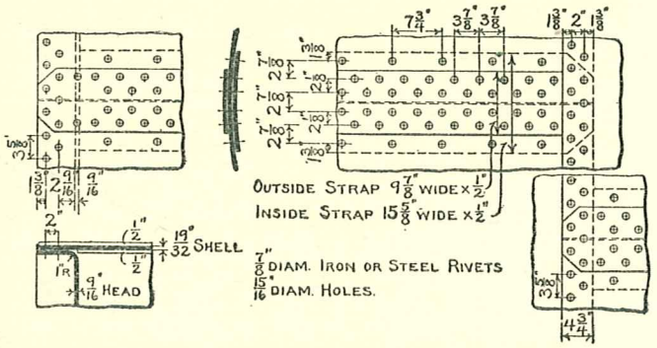
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL ——— 19 FT. 9 INS.
THICKNESS OF SHELL ——— 19/32 IN
THICKNESS OF HEADS ——— 9/16 IN
THICKNESS OF MORISON FURNACES ——— 5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS ——— 2 INS.
DIAMETER OF THREADED BOLT ENDS ——— 2 3/8 INS.

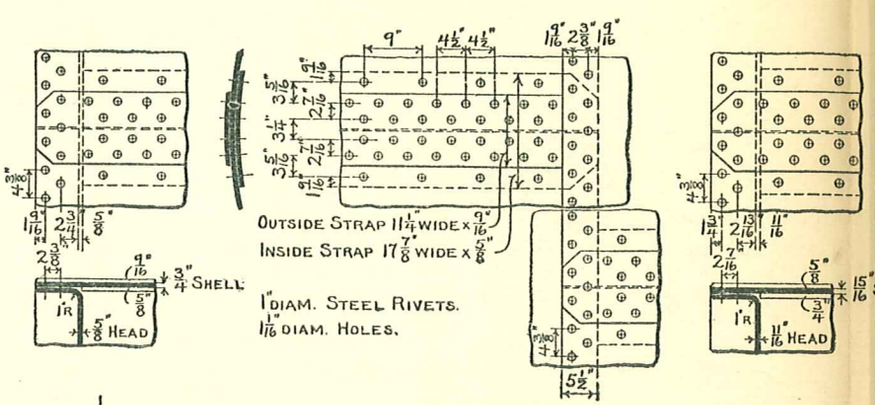
PLAN OF RIVETING.

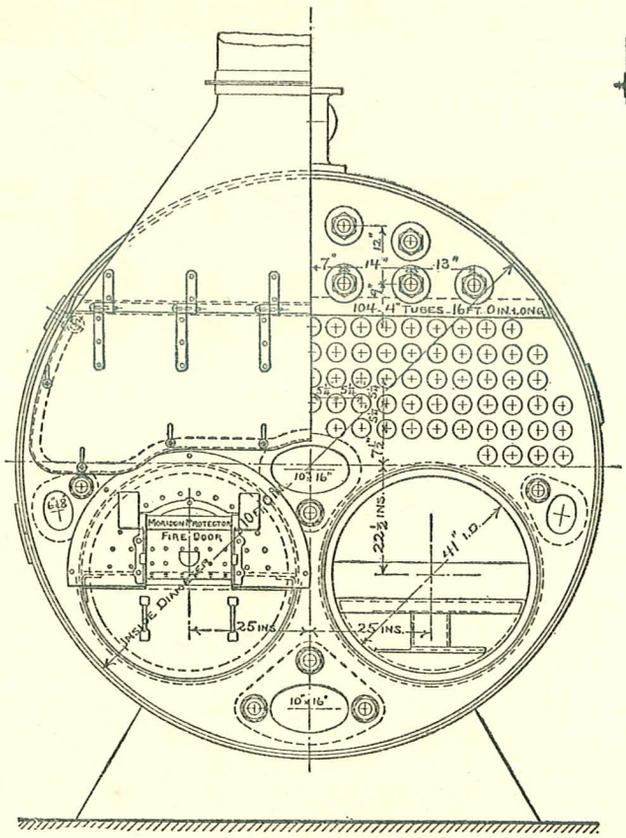


130 LBS. STEAM PRESSURE.

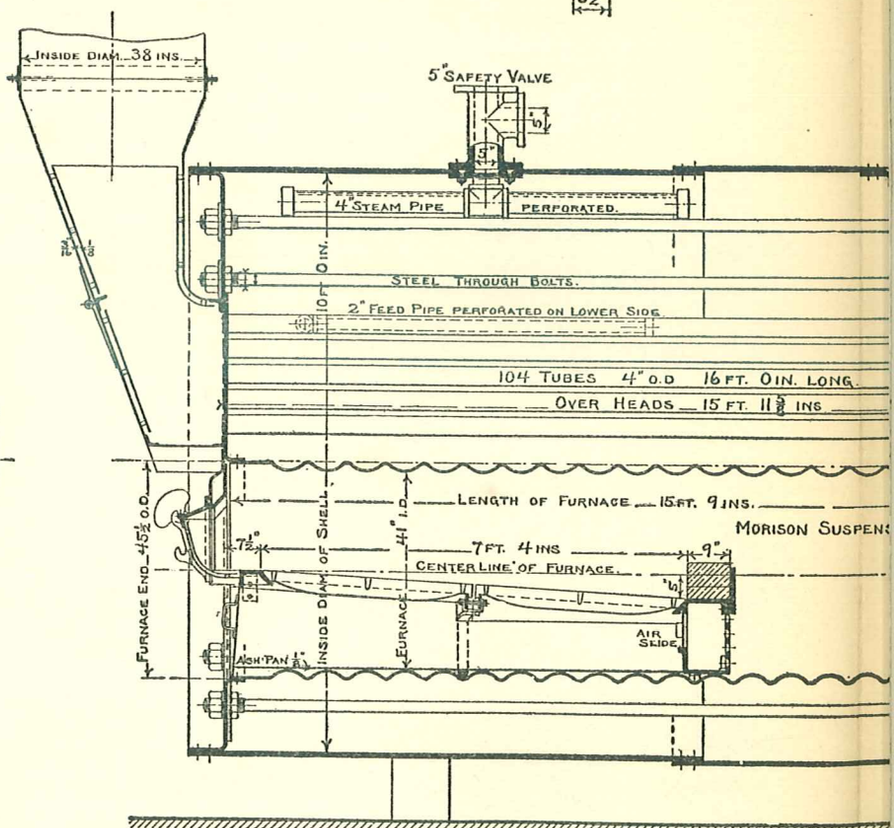
LENGTH OF BOILER OVER ALL ——— 19 FT. 9 3/4 INS.
THICKNESS OF SHELL ——— 19/32 IN.
THICKNESS OF HEADS ——— 9/16 IN.
THICKNESS OF MORISON FURNACES ——— 5/16 IN
DIAMETER OF STEEL THROUGH BOLTS ——— 2 1/2 INS.
DIAMETER OF THREADED BOLT ENDS ——— 2 5/8 INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONAL ELE

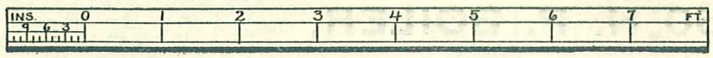
DRAWING No. 12.

250 Horse Power. Type B.

BY

EW YORK (BOROUGH OF BROOKLYN.)

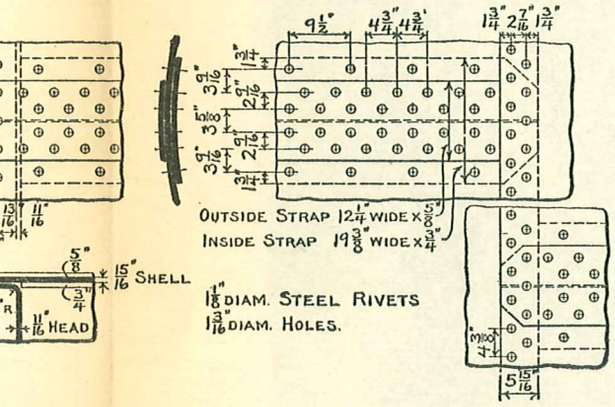
Scale for Riveting Plans.



160 lbs. Steam Pressure.

Length of Boiler over all ——— 19 ft 10 ins.
Thickness of Shell ——— 15/16 in
Thickness of Heads ——— 11/16 in.
Thickness of Morison Furnaces ——— 15/32 in.
Diameter of Steel Through Bolts ——— 2 1/2 ins.
Diameter of Threaded Bolt Ends ——— 2 7/8 ins.

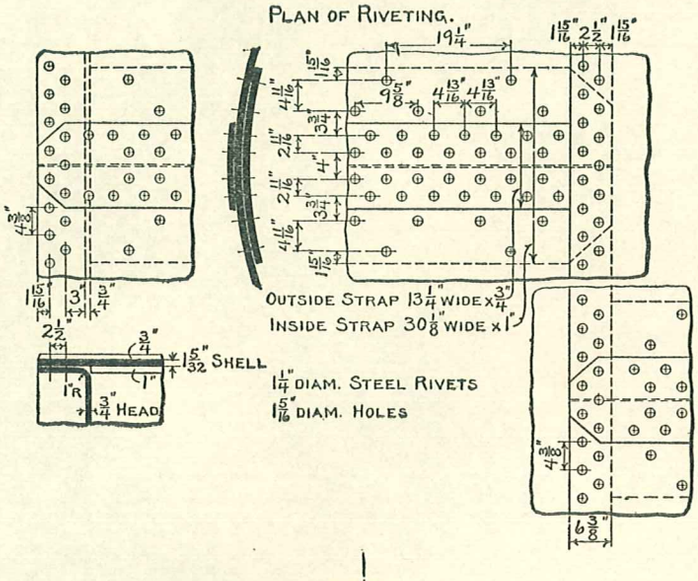
Plan of Riveting.

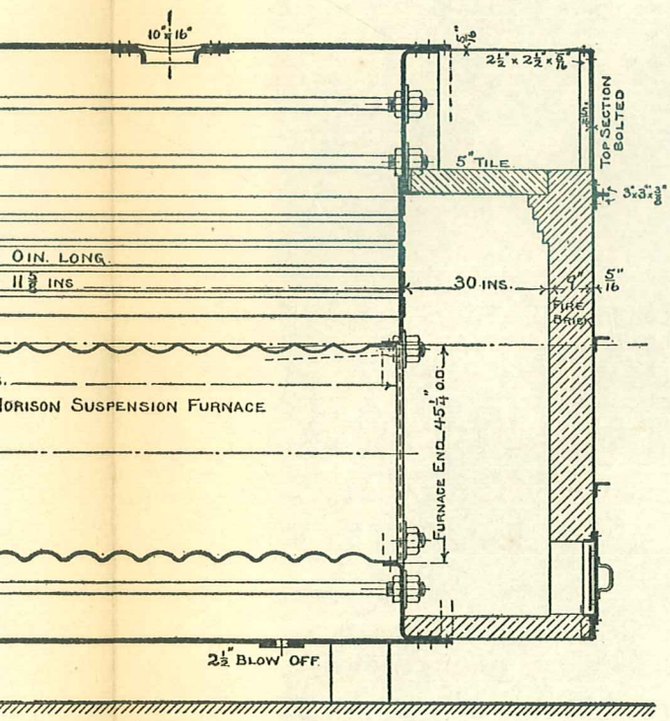


200 lbs. Steam Pressure.

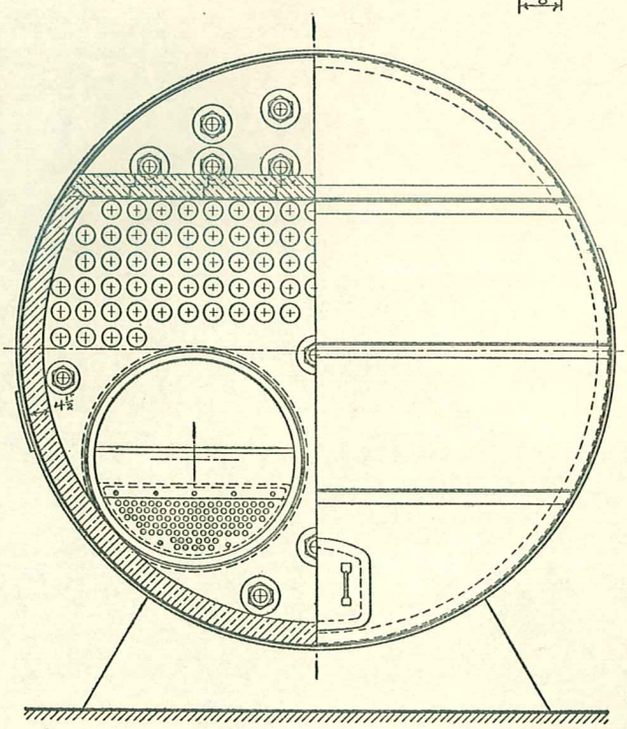
Length of Boiler over all ——— 19 ft. 10 1/2 ins.
Thickness of Shell ——— 1 5/32 ins.
Thickness of Heads ——— 3/4 in.
Thickness of Morison Furnaces ——— 15/32 in.
Diameter of Steel Through Bolts ——— 2 3/4 ins.
Diameter of Threaded Bolt Ends ——— 3 1/8 ins.

Plan of Riveting.



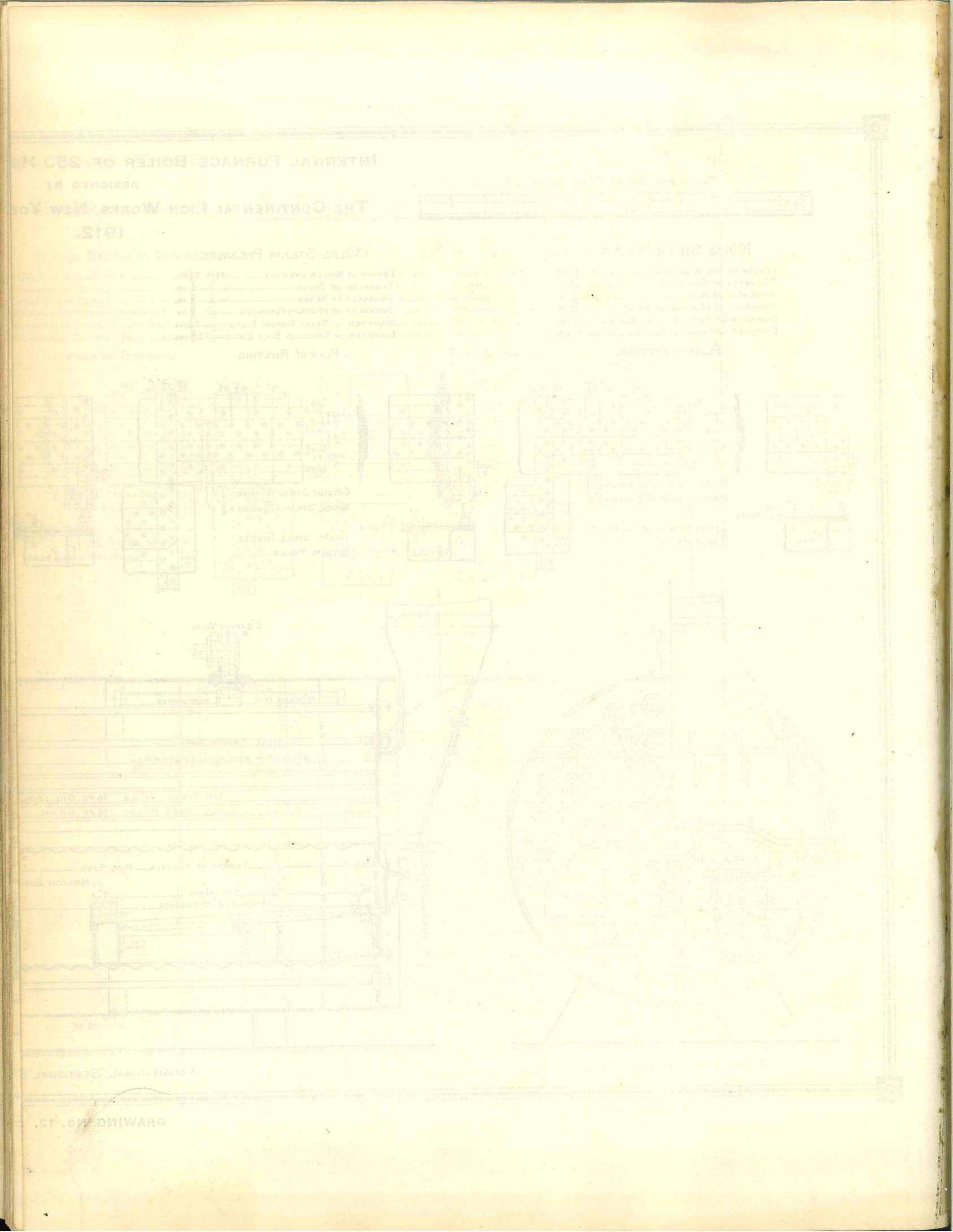


ectional Elevation.



Sectional Elevation Rear Exterior Elevation.

No. 12.



DESIGN OF

300 H. P. BOILER,

TYPE A.

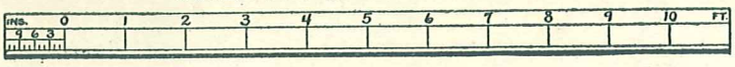
INTERNAL FURNACE BOILER OF 300

DESIGNED BY

THE CONTINENTAL IRON WORKS, NEW

1912.

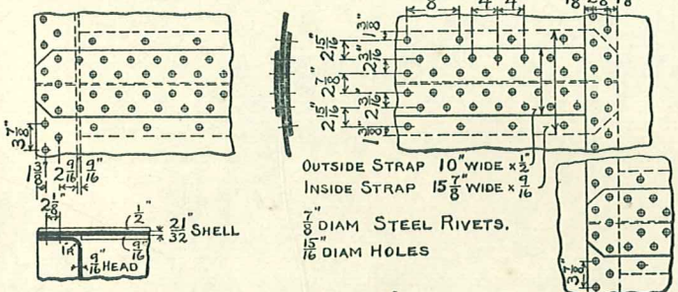
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL — 16 FT. 9 INS.
THICKNESS OF SHELL — 21/32 IN.
THICKNESS OF HEADS — 9/16 IN.
THICKNESS OF MORISON FURNACES — 11/32 IN.
DIAMETER OF STEEL THROUGH BOLTS — 2 INS.
DIAMETER OF THREADED BOLT ENDS — 2 3/8 INS.

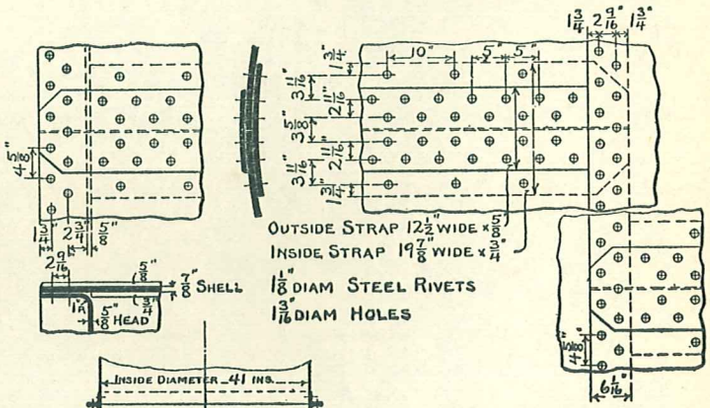
PLAN OF RIVETING.

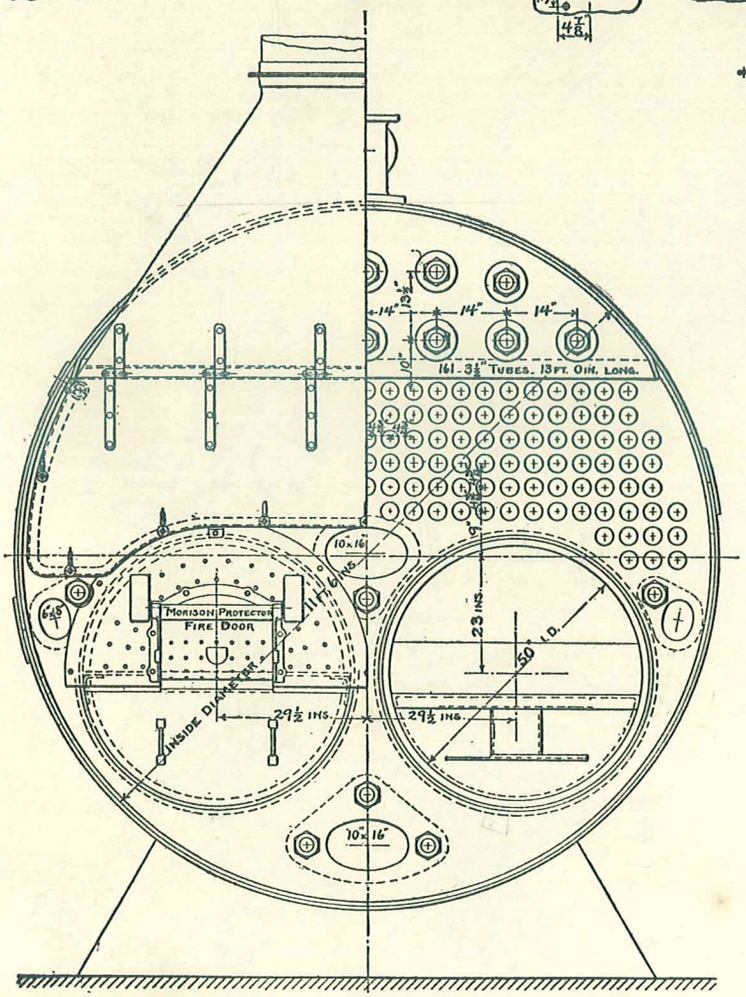


130 LBS. STEAM PRESSURE.

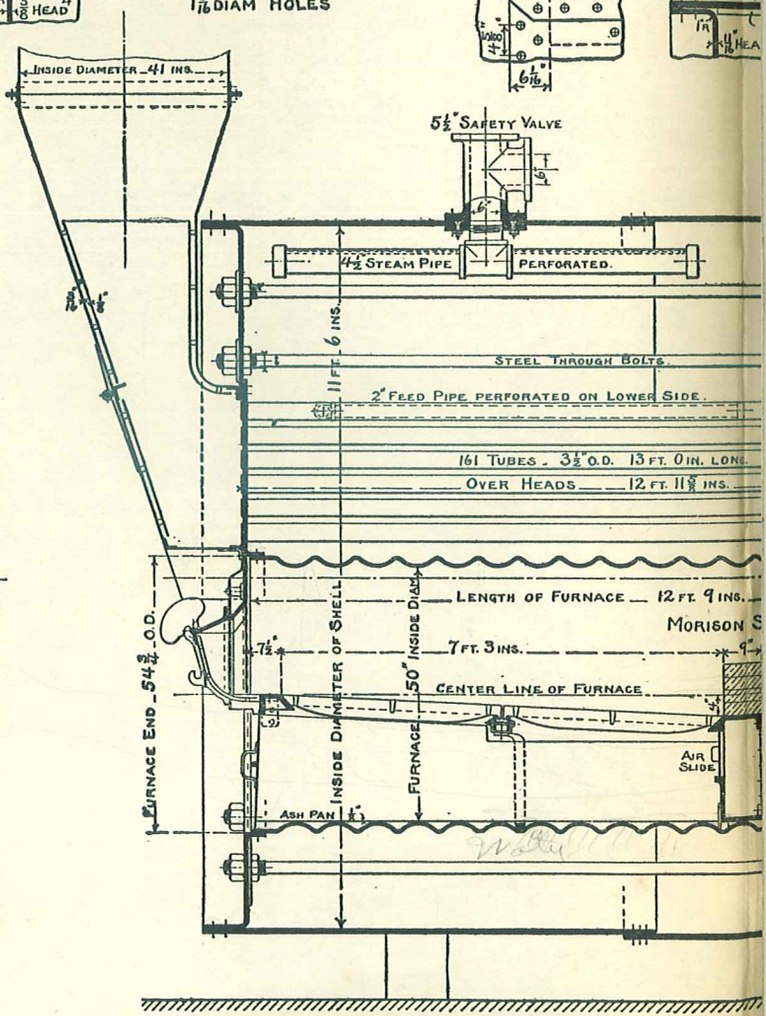
LENGTH OF BOILER OVER ALL — 16 FT. 10 INS.
THICKNESS OF SHELL — 7/8 IN.
THICKNESS OF HEADS — 5/8 IN.
THICKNESS OF MORISON FURNACES — 7/16 IN.
DIAMETER OF STEEL THROUGH BOLTS — 2 1/4 INS.
DIAMETER OF THREADED BOLT ENDS — 2 5/8 INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SECTIONAL

DRAWING NO. 1

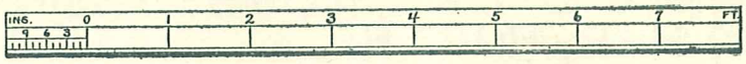
OF 300 HORSE POWER. TYPE A.

SIGNED BY

RKS, NEW YORK (BOROUGH OF BROOKLYN.)

1912.

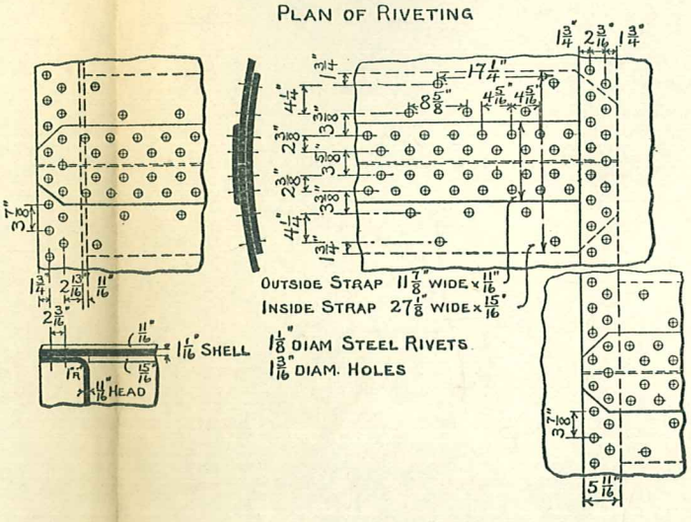
SCALE FOR RIVETING PLANS.



160 LBS. STEAM PRESSURE

LENGTH OF BOILER OVER ALL —— 16 FT 9 3/4 INS.
THICKNESS OF SHELL —— 1 1/16 INS.
THICKNESS OF HEADS —— 11/16 IN.
THICKNESS OF MORISON FURNACES —— 9/16 IN.
DIAMETER OF STEEL THROUGH BOLTS —— 2 1/2 INS.
DIAMETER OF THREADED BOLT ENDS —— 2 7/8 INS.

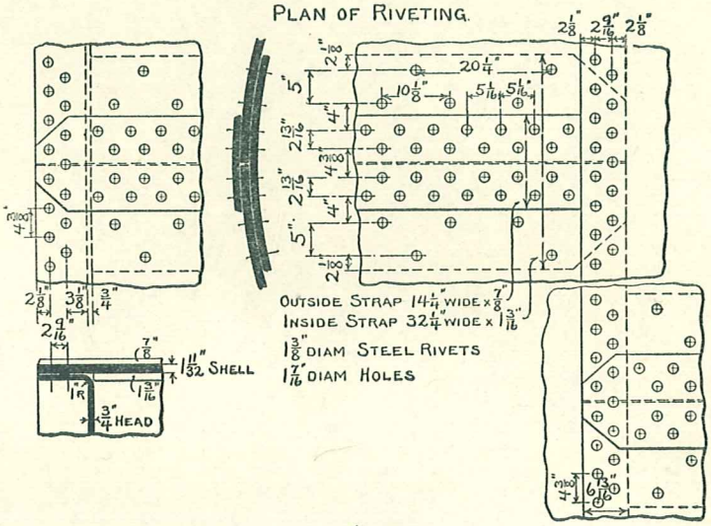
PLAN OF RIVETING

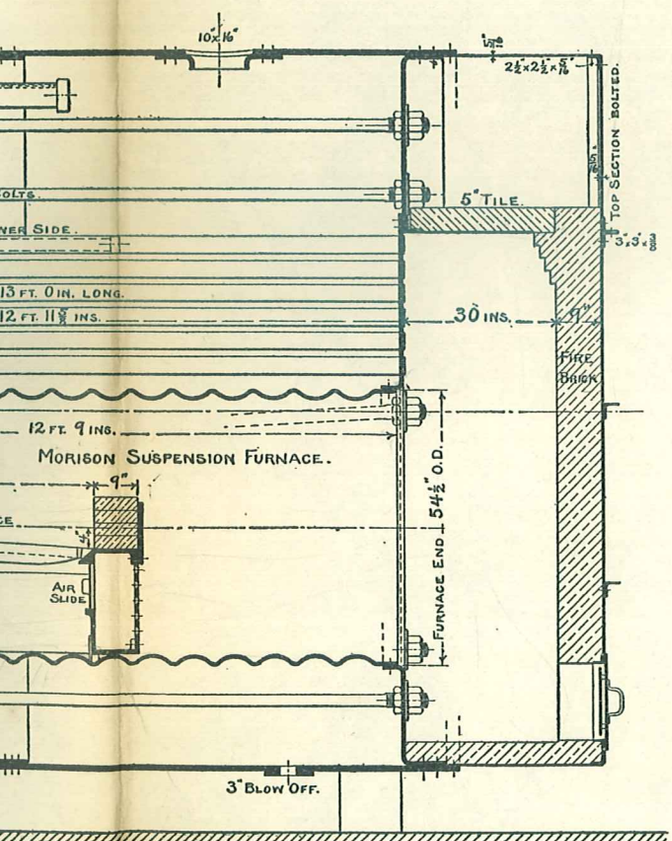


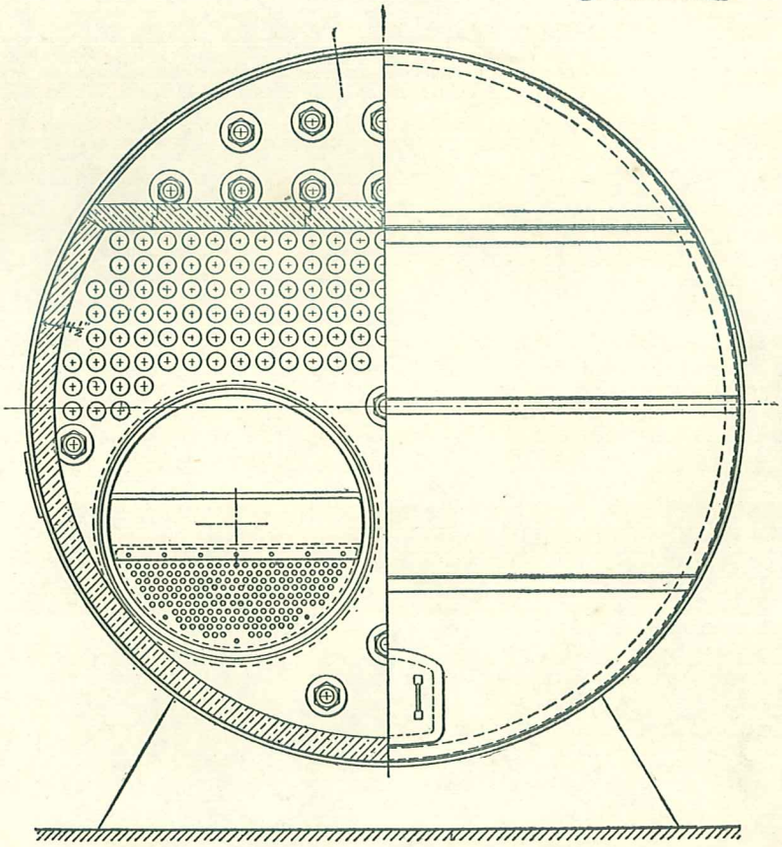
200 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL —— 16 FT 10 3/4 INS.
THICKNESS OF SHELL —— 1 11/32 INS.
THICKNESS OF HEADS —— 3/4 IN.
THICKNESS OF MORISON FURNACES —— 11/16 IN.
DIAMETER OF STEEL THROUGH BOLTS —— 2 5/8 INS.
DIAMETER OF THREADED BOLT ENDS —— 3 1/8 INS.

PLAN OF RIVETING.



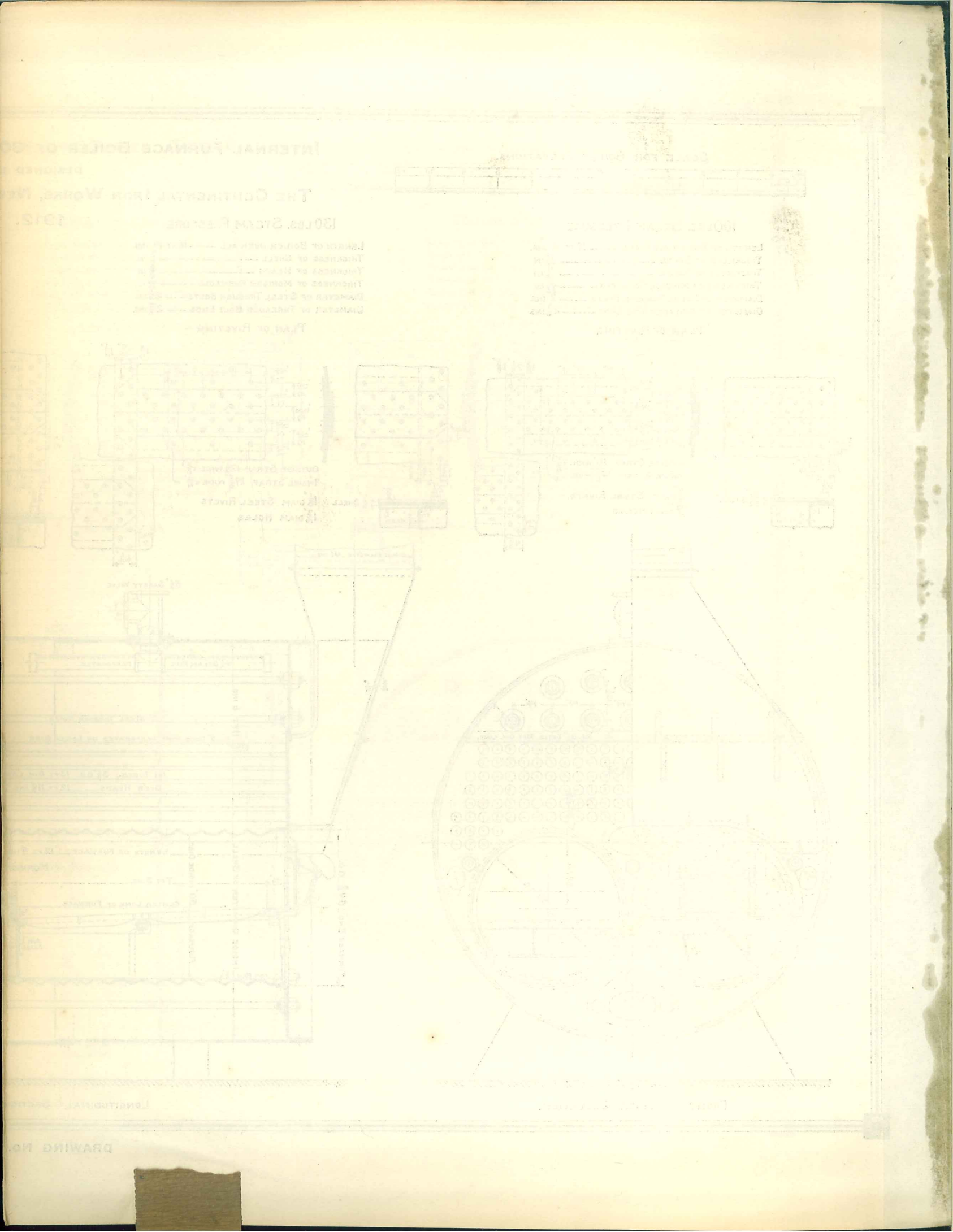




L SECTIONAL ELEVATION.

SECTIONAL ELEVATION. REAR EXTERIOR ELEVATION.

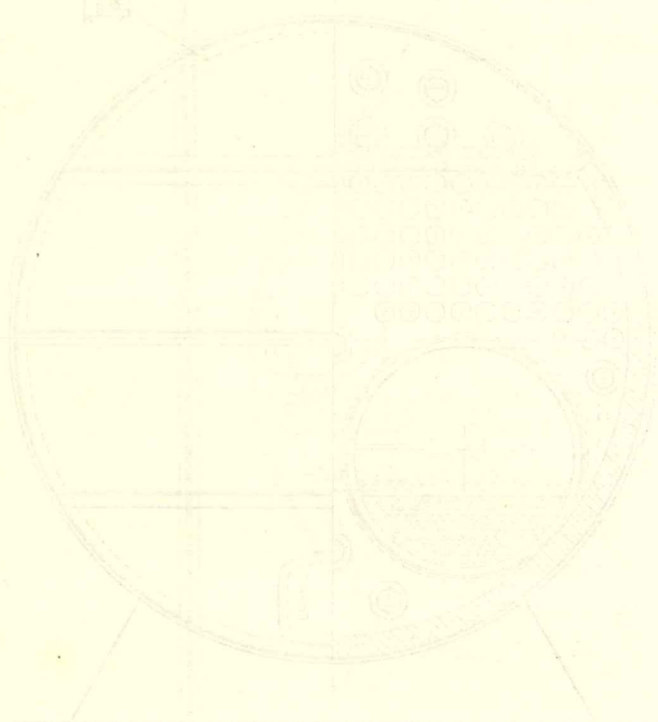
WING No. 13.



DESIGN OF

300 H. P. BOILER,

TYPE B.



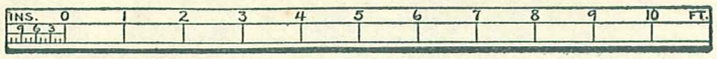
INTERNAL FURNACE BOILER OF 30

DESIGNED

THE CONTINENTAL IRON WORKS, NE

1912.

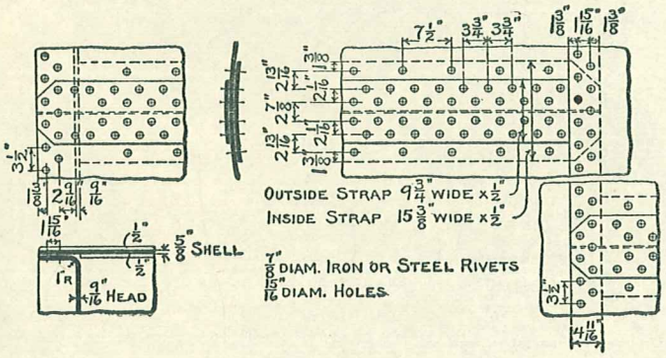
SCALE FOR BOILER ELEVATIONS.



100 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	19 FT. 8 3/4 INS.
THICKNESS OF SHELL	5/16 IN.
THICKNESS OF HEADS	9/16 IN.
THICKNESS OF MORISON FURNACES	5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS	2 INS.
DIAMETER OF THREADED BOLT ENDS	2 3/8 INS.

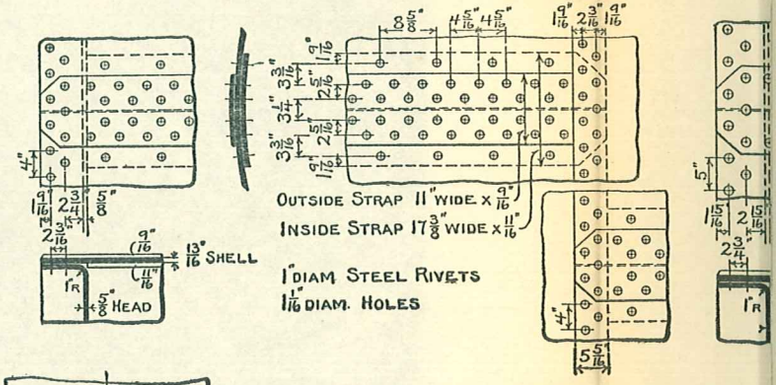
PLAN OF RIVETING

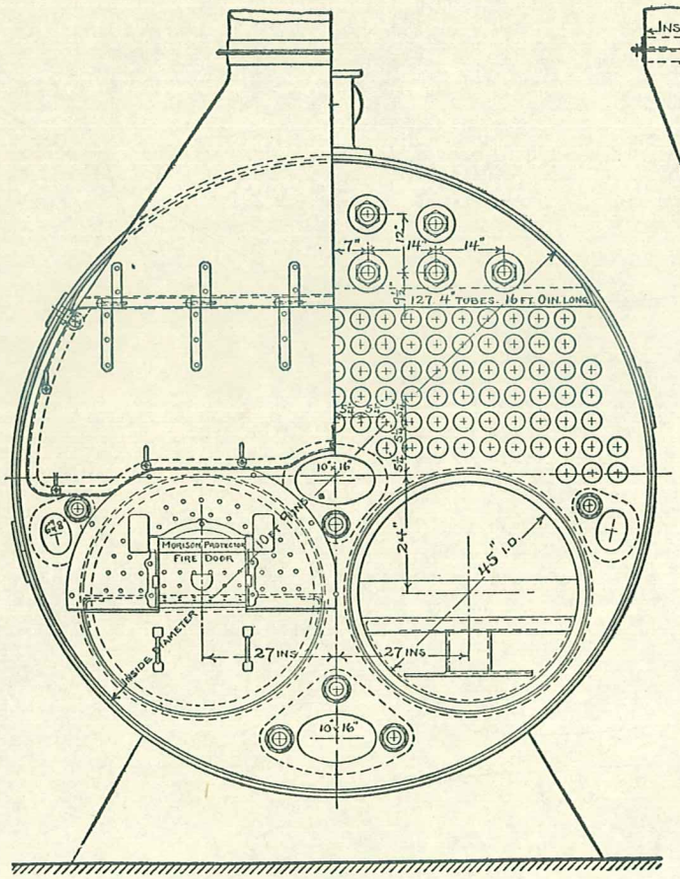


130 LBS. STEAM PRESSURE

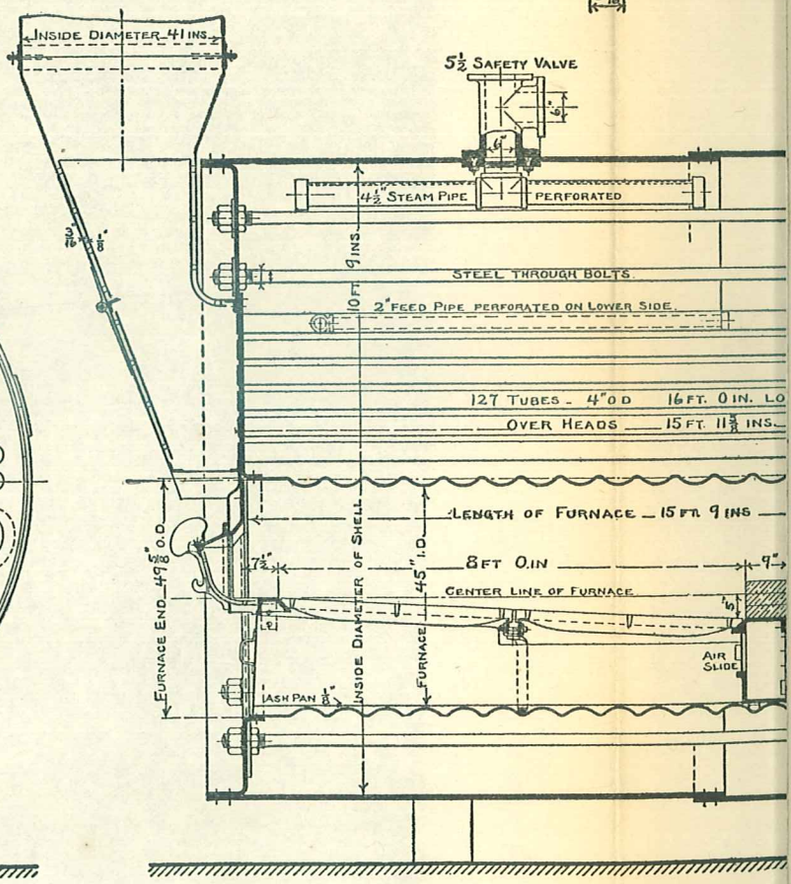
LENGTH OF BOILER OVER ALL	19 FT. 9 1/2 INS.
THICKNESS OF SHELL	13/16 IN.
THICKNESS OF HEADS	5/8 IN.
THICKNESS OF MORISON FURNACES	5/8 IN.
DIAMETER OF STEEL THROUGH BOLTS	2 1/4 INS.
DIAMETER OF THREADED BOLT ENDS	2 5/8 INS.

PLAN OF RIVETING.





FRONT EXTERIOR ELEVATION.



LONGITUDINAL SEC

DRAWING N

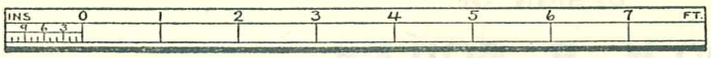
OILER OF 300 HORSE POWER. TYPE B.

DESIGNED BY

I WORKS, NEW YORK (BOROUGH OF BROOKLYN.)

1912.

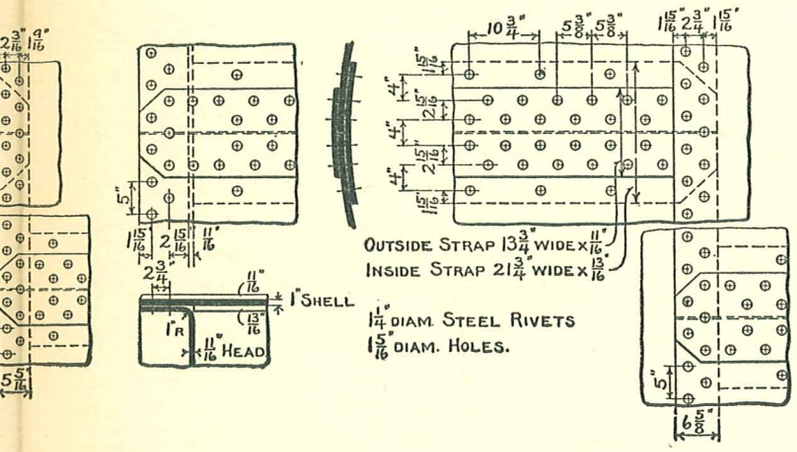
SCALE FOR RIVETING PLANS.



160 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	19 FT 10½ INS.
THICKNESS OF SHELL	1 IN.
THICKNESS OF HEADS	11/16 IN.
THICKNESS OF MORISON FURNACES	½ IN.
DIAMETER OF STEEL THROUGH BOLTS	2½ INS.
DIAMETER OF THREADED BOLT ENDS	2⅞ INS.

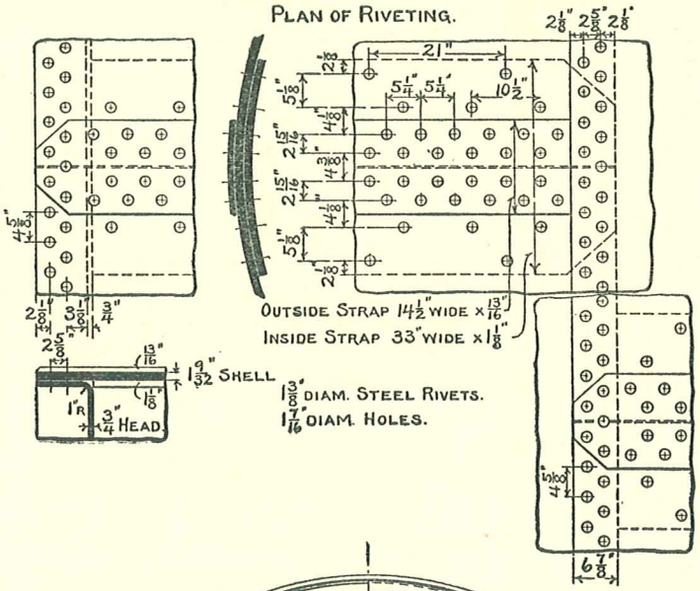
PLAN OF RIVETING

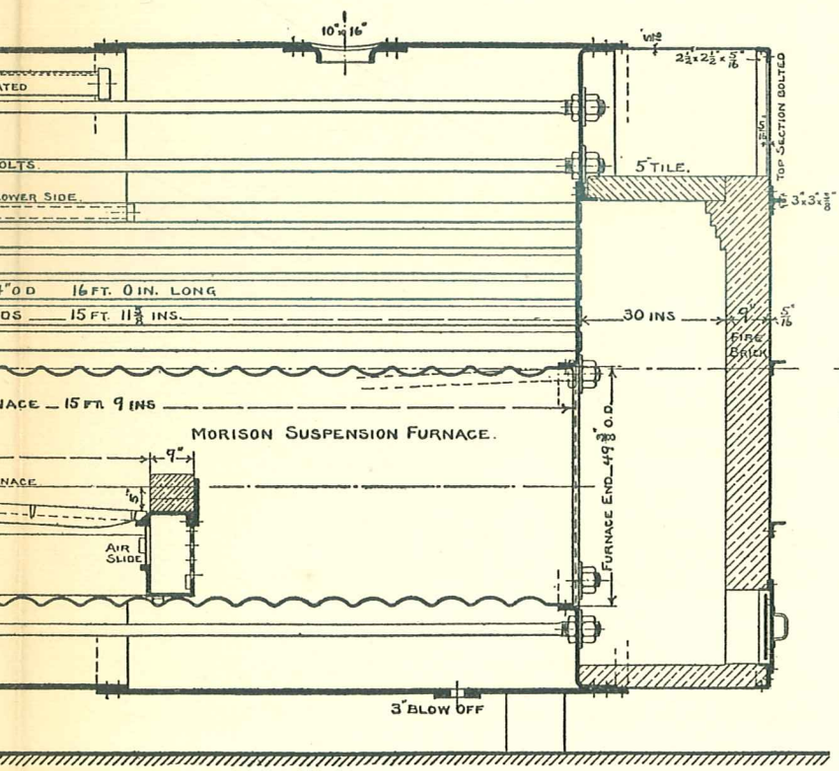


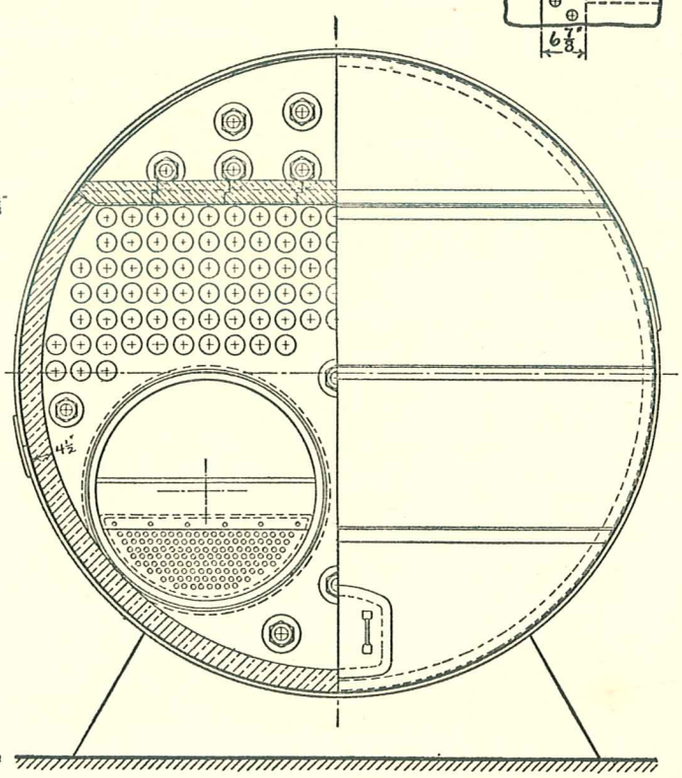
200 LBS. STEAM PRESSURE.

LENGTH OF BOILER OVER ALL	19 FT 10 3/4 INS.
THICKNESS OF SHELL	1 9/32 INS.
THICKNESS OF HEADS	7/16 IN.
THICKNESS OF MORISON FURNACES	5/16 IN.
DIAMETER OF STEEL THROUGH BOLTS	2 3/4 INS.
DIAMETER OF THREADED BOLT ENDS	3⅛ INS.

PLAN OF RIVETING.







ONGITUDINAL SECTIONAL ELEVATION. SECTIONAL ELEVATION REAR EXTERIOR ELEVATION.

DRAWING No. 14.

DETAILS OF

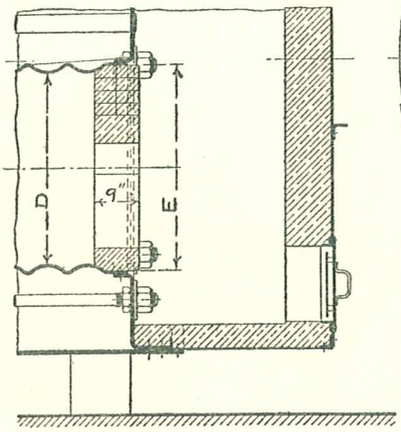
INTERNAL FURNACE BOI

AS DESIGNED BY

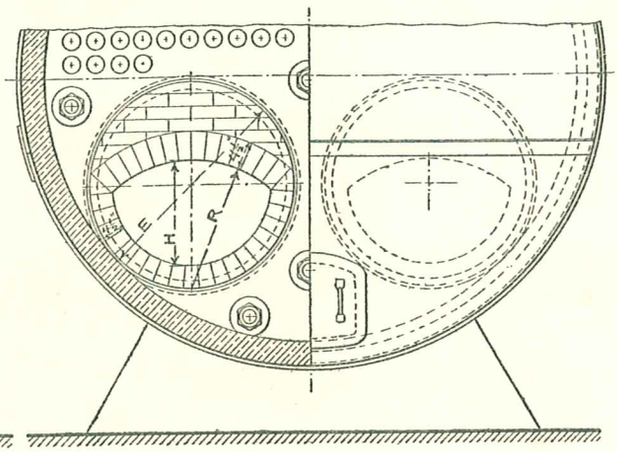
THE CONTINENTAL IRON WORKS,

(BOROUGH OF BROOKLYN.)

1912.



SECTIONAL ELEVATION.



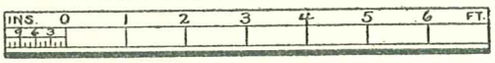
REAR SECTIONAL AND EXTERIOR ELEVATIONS.

FIGURE 1.

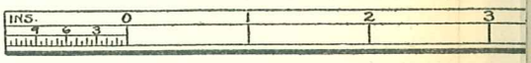
DIMENSIONS OF FIRE BRICK BAFFLE FOR REAR END OF FURNACE.

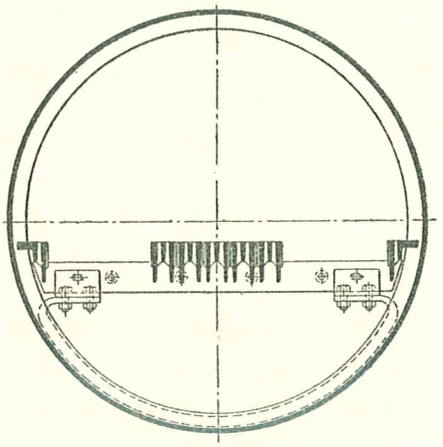
INSIDE DIAM. OF FURNACE D	INSIDE DIAM. FURNACE END E	RADIUS OF ARCH R	HEI OPI
36 INS	39 INS.	24½ INS	2
38 "	41 "	26 "	2
41 "	44 "	28 "	2
45 "	48 "	31 "	2
50 "	53 "	34½ "	3

SCALE FOR FIGURES 1 AND 2.



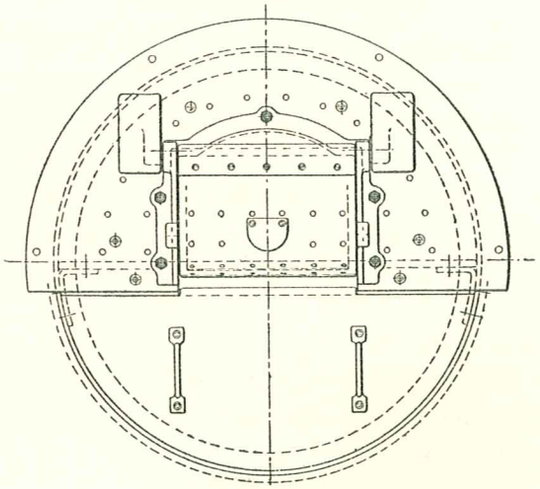
SCALE FOR FIGURE 3



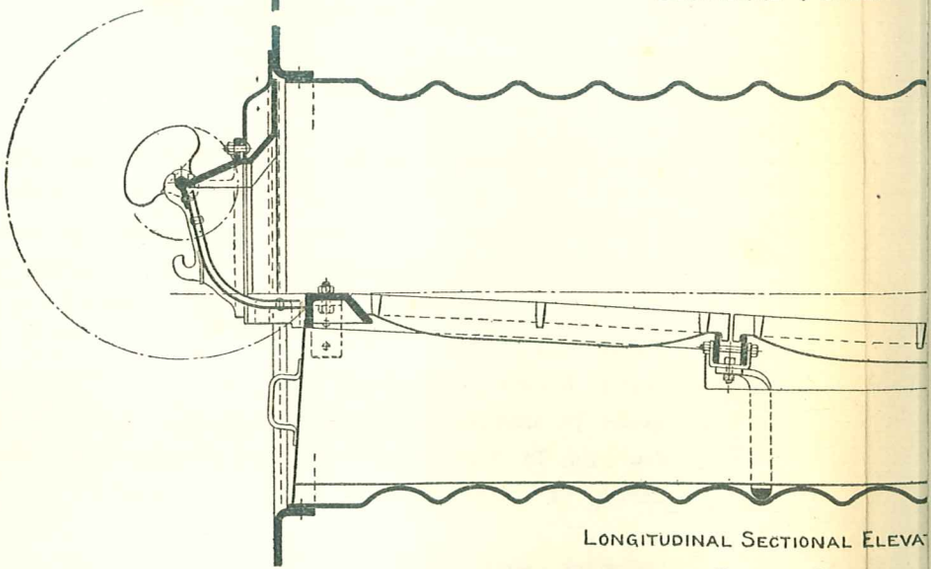


SECTIONAL ELEVATION SHOWING GRATE AND BEARER BARS.

SECTIONAL PLAN.



FRONT ELEVATION.



LONGITUDINAL SECTIONAL ELEVA

FIGURE 3.

DRAWING No. 15.

TAILS OF

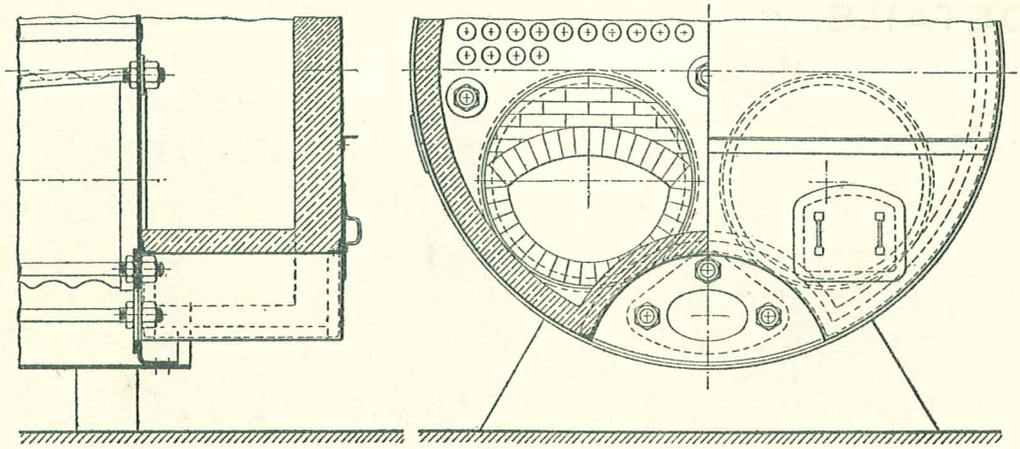
URNACE BOILERS

ESIGNED BY

RON WORKS, NEW YORK,

I OF BROOKLYN.)

1912.

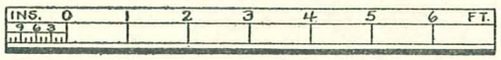


SECTIONAL ELEVATION

REAR SECTIONAL AND EXTERIOR ELEVATIONS.

FIGURE 2.

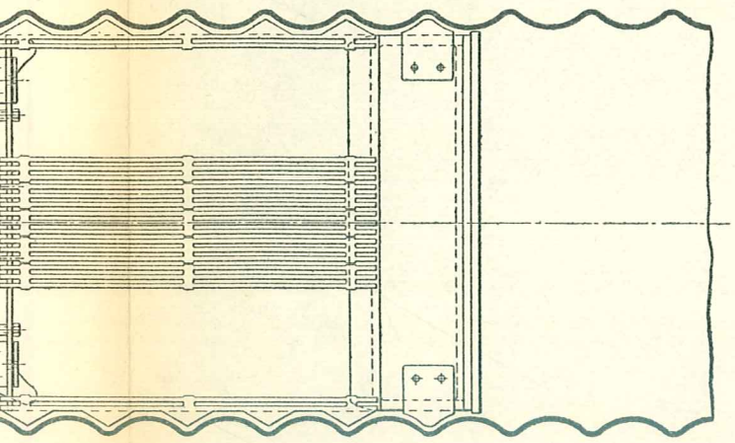
SCALE FOR FIGURES 1 AND 2



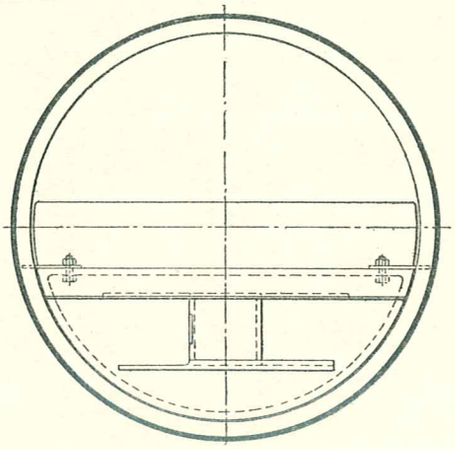
FIRE BRICK BAFFLE ARCH
END OF FURNACE

AM. END	RADIUS OF ARCH R	HEIGHT OF OPENING H
S.	24½ INS	20 INS.
	26 "	21½ "
	28 "	23½ "
	31 "	26½ "
	34½ "	30 "

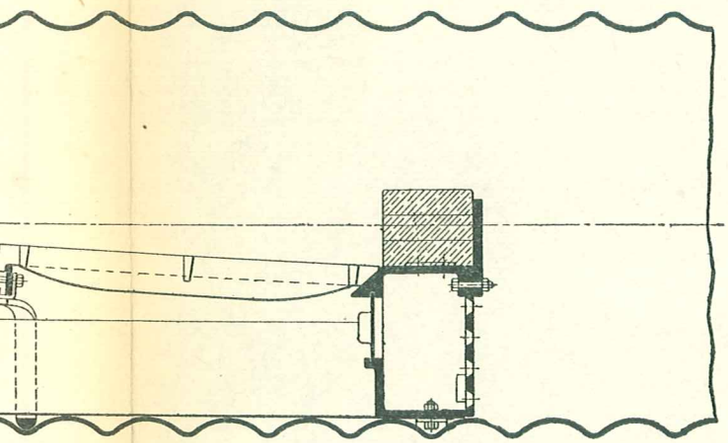
FOR FIGURE 3



ONAL PLAN.

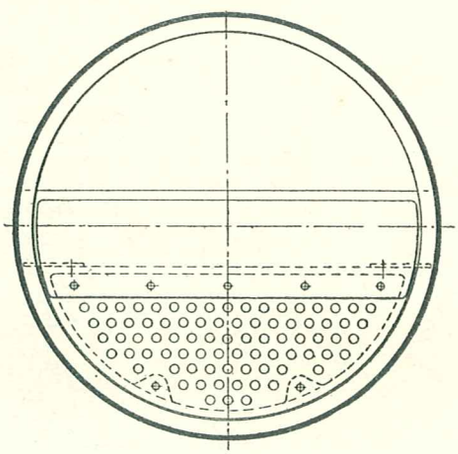


FRONT ELEVATION OF
BRIDGE WALL



SECTIONAL ELEVATION.

GURE 3.



REAR ELEVATION OF
BRIDGE WALL.

WING No. 15.

NOTE:—The following form of specification may be used as a guide, the blank spaces being filled in by figures obtained from the preceding drawings. It is probably sufficiently complete for ordinary purposes, but may be elaborated to such extent as may be necessary for special cases.

FORM OF

SPECIFICATION

FOR

INTERNAL FURNACE BOILER

OF HORSE POWER.

GENERALLY. . . Boiler to be of Horse Power (one Horse Power to mean 34½ lbs. of water evaporated per hour from a feed water temperature of 212° Fah. into steam at Atmospheric pressure), and in all respects properly proportioned for a steam pressure of lbs. per square inch.

MATERIAL . . . . The material from which the Shell and Heads of the Boiler to be constructed, shall be of Open Hearth FLANGE Steel, stamped 60,000 lbs. Tensile Strength.

The Furnace to be made of Open Hearth FIRE BOX Steel, having a Tensile Strength of from 54,000 to 67,000 lbs. per square inch.

In a parallel test piece, 8 inches long, when tested to destruction, the elongation shall not be less than 26% and the elastic limit shall not be less than one-half the ultimate tensile strength. A similar test piece shall permit of its ends being bent cold in a parallel direction, about a curve, whose inner radius shall not be more than the thickness of the test piece. This test to be made without fracture at any point.

A chemical analysis of the material shall show not more than .18% of carbon or .03% of either phosphorus or sulphur.

A full report of the physical and chemical characteristics of the material shall be furnished to the purchasers of the Boiler , if required.

SHELL. . . . . . The Shell of the Boiler to be inches, Inside Diameter, and inch in thickness. The distribution of the plates and also of the rivets of the various joints to be as shown by the drawing.

HEADS. . . . . . The front and rear Heads to be inch thick, and to have their circumferential flanges of such diameter as to properly fit the shell. These flanges to be turned to an internal radius of not less than one inch. The flanges of the furnace openings, in both the front and rear Head, to be turned inward (in respect to the boiler) and to be of sufficient length for single rows of rivets. The Furnace opening of the front Head should be one-quarter of an inch greater in diameter than the Furnace opening of the rear Head, to permit of the easy insertion of the Furnace into position.

FURNACE. . . . . The Furnace , to be of the MORISON SUSPENSION type, manufactured by THE CONTINENTAL IRON WORKS, New York City, will be

inches inside diameter, by feet, and inches long, and inch thick, having plain parts, at the front and rear ends, of sufficient length to be single riveted to the furnace opening flanges and the boiler heads.

TUBES. . . . . The Boiler will contain Tubes, inches outside diameter, spaced inches centres, and located as shown on the drawing.

The tube holes in the heads of the boiler are to be bored to accurately fit the tube. After the tubes are in position, they are to be carefully expanded (preferably by a Prosser Tube Expander) to insure absolute tightness, after which their ends are to be beaded over.

BACK CONNECTION. . The rear course of the boiler shell is to extend about 2½ inches beyond the flange of the rear head, and to it is to be bolted an extension forming a back connection. This extension may be of "tank steel," of sufficient width to provide for a combustion chamber, having a clear depth of 30 inches. Riveted to the inside of this extension, at its outer end, is to be a ring of 2½ x 2½ x 5/16 inch angle, to which will be bolted a head, also of "tank steel," made in two pieces, joined together by bolts, as shown on the drawing. In the lower portion of this head there is to be an opening surrounded by an angle ring, forming a door frame 18 inches wide by 15 inches high, to which will be fitted a suitable door, provided with latch, hinges and baffle plate. Across the head there will be a stiffening angle bar, as shown.

The inside circumference of the Combustion Chamber is to be lined with fire brick, placed on edge, forming a lining 4½ inches thick. This lining to extend circumferentially upward to a point one inch above the top of the upper row of tubes. The back of the Combustion Chamber will be lined with fire brick, 9 inches thick. This lining of the rear head or back end will be carried to the same height as the circumferential lining, and the opening at the top bridged over by fire brick tiles, about 5 inches thick. One end of the tiles to rest upon an angle bar, riveted to the back head of the boiler, the other end upon the rear lining of the chamber.

RIVETS. . . . . The rivet holes are to be either drilled, or punched 1/16 of an inch small, then reamed to requisite size. No drifting of unfair holes will be permitted. The rivet holes in the ends of the furnace are to be countersunk on the inside, and the rivets driven upon the inside of the frame, leaving slightly spherical rivet heads.

BRACES. . . . . The boiler heads are to be braced with through bolts inches diameter, upset at each end to inches diameter, and threaded. They are to be secured to the heads with outside hexagonal nuts, provided with washers 8 inches in diameter, and of 6/10 the thickness of the boiler heads. Upon the inside there are to be suitable washers and nuts (of half thickness) screwed up tight against the head. If preferred, the flat surfaces of the heads may be braced by means of the McGregor Solid Steel Braces, instead of the through bolts, as above described, in which case the Braces are to be of sufficient number, and so located as to thoroughly stay the heads.

MAN AND HAND HOLE OPENINGS. . . Upon the top of the shell there is to be located a Manhole and Cover of the Eclipse type, 10 x 16 inch opening, provided with the usual clamps and bolts. In the front head below the tubes there are to be located Handhole and Manhole Openings, as shown, fitted with suitable covers and guards. The openings in

the shell and heads are to be reinforced by strengthening pieces, of equal section to the plates in which the holes are cut, and securely riveted on the inside of the boiler.

FRONT CONNECTION. . The Front Connection to be of the general design shown by the drawing, and to be made of sheet metal 3/16 of an inch thick, secured to the front head of the boiler by $2\frac{1}{4}$ x $2\frac{1}{4}$ angles and stud bolts, to have an interior lining of metal $\frac{1}{8}$ of an inch thick, spaced one inch asunder by means of thimbles. At its upper portion it will be drawn to a suitable shape, and surrounded by a ring $2\frac{1}{2}$ x $2\frac{1}{2}$ x $\frac{1}{4}$ angle, to provide for the reception of a smoke stack, inches in diameter. The front of the connection to be provided with a door, made in pieces, fitted with forged hinges and latches, for securing it in place. The door to be provided with a lining, affording a one inch air space.

FURNACE DOORS, ETC. . . The front of the furnace to be closed by a MORISON PROTECTOR FURNACE FRONT AND DOOR, and below it is to be fitted a sheet iron ash pit door, provided with two forged handles and proper means for holding it in position.

GRATE AND BRIDGE WALL. . There is to be a cast iron Bridge Wall, topped with fire brick, placed in the furnace, in a suitable position to provide for a grate area of square feet. Midway between it and the dead plate of the furnace front is to be located a double bearer bar, the ends of which are to rest upon suitable supports.

The Bridge Wall Casting and also the centre Bearer Bar are to be secured in place by suitable clips attached to them, and fitted into the corrugations of the furnace, and not by studs or bolts screwed into the corrugated furnace itself.

The Grate Bars to be of cast iron, provided with openings to suit the character of fuel to be used. Beneath the grate is to be an Ash Pan, formed of $\frac{1}{8}$ inch "tank steel," bent to shape, and extending from the Bridge Wall to front of furnace.

FITTINGS. . . . Upon the top of the shell and about midway of the length of the front course is to be located a cast iron flanged nozzle, inches diameter, so arranged as to provide at its upper flange for a inch safety valve, and at its side a flanged nozzle to be suitable for attaching a steam connection.

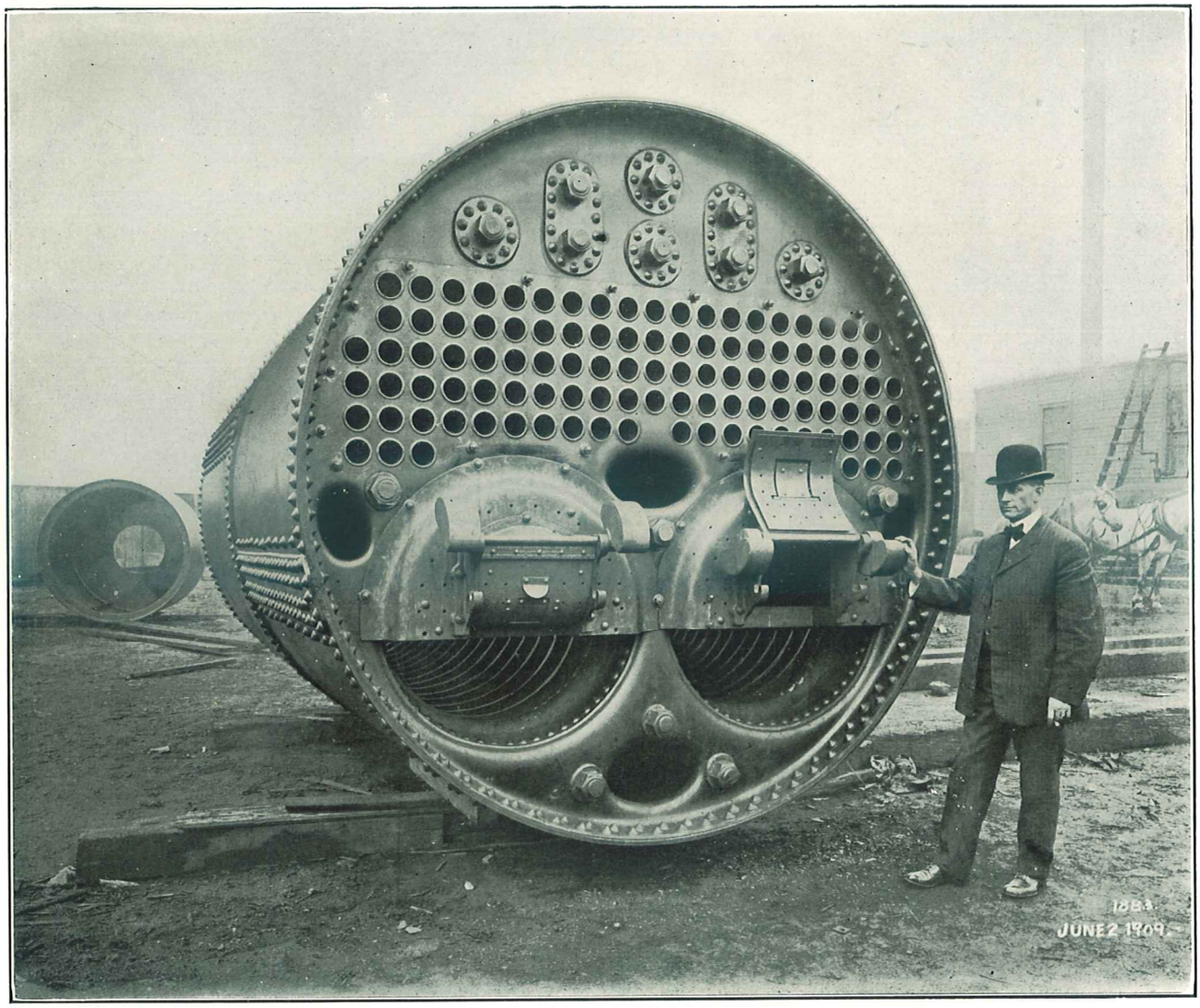
Extending into the boiler from this cast iron nozzle there will be a short pipe nipple, fitted to a Tee, from the longitudinal branches of which will extend a dry pipe, inches in diameter, each branch of which will be about 3 feet long, perforated along its upper surface with holes, giving an area of about $2\frac{1}{2}$ times the area of the steam pipe. Upon the side of the boiler will be located a feed pipe, inches diameter. It will be formed of a short nipple entering the shell, to which will be connected by means of an elbow, a pipe inches diameter, extending about one-half the length of the boiler, having perforations along its lower surface, about twice the cross-sectional area of the pipe. This internal pipe will be located about the height of the top row of tubes, and parallel thereto, its extreme end being held in position by means of a suitable fastening. Located at the bottom of the shell, and at its extreme rear end, will be provided an opening suitable for a inch diameter blow-off cock. The hole in the shell being reinforced by a pressed steel pipe flange riveted thereto.

SADDLES. . . . Boiler to rest on two suitable Saddles, which may be made of either cast iron, or steel plate construction.

The upper surface of the Saddle is to conform closely to the shell of the boiler.

Suitable piers of concrete or masonry are to be provided by the purchaser of the boiler, to serve as foundations for the Saddles.

TEST. . . . . . Before leaving the place of manufacture, the boiler will be completely filled with water, slightly warmed, and subjected to a test pressure of lbs. per square inch, and to be tight at that pressure.



200 H. P. TYPE B INTERNAL FURNACE BOILER.
ROOSEVELT ESTATE BUILDING 13TH STREET AND BROADWAY, NEW YORK CITY.

TESTIMONIALS.

Newport News Light & Water Company,

Room 1801, 30 Church St.

NEW YORK, May 11th, 1908.

THE CONTINENTAL IRON WORKS,

Brooklyn, N. Y.

GENTLEMEN:—Referring to your recent inquiry as to the relative merits of internally fired boilers and those fired externally, I have to say that for over fifteen years we have operated two internally fired boilers at our water pumping station in Virginia, with little or no repairs until the present year, when we renewed the tubes. These boilers have been economical and very satisfactory.

I would state further that we have a battery of four Scotch boilers serving our Newport News Shipbuilding & Dry Dock Co. plant, which have been in constant use over sixteen years and have given satisfaction in every way.

We prefer boilers of the internally fired type, believing that the heat in this way is best utilized in the evaporation of water, the percentage of loss in radiation being reduced to a minimum.

Very truly yours,

C. B. ORCUTT,

President of Newport News Light and Water Co., also of Newport News Shipbuilding & Dry Dock Co.

Warren Electric Light & Water Department.

W. R. Haney, Superintendent.

WARREN, Minn., April 8, 1908.

MR. J. G. ROBERTSON,

St. Paul, Minn.

DEAR SIR:—In reply to your letter of the 6th inst. regarding the Continental corrugated furnace boilers in use here, wish to say that they are giving us very good service and are satisfactory in every way; one has been in use for over five years and three years of this time this boiler was in service every night, and all the repairs in the five years has been one new fire tile and the tubes expanded once.

The other boiler has been in almost constant use for the past two and one-half years without the expenditure of one cent for repairs.

We prefer the internal fired boilers, as they have proven themselves more efficient than any tubular boilers the writer has ever been in charge of. We are evaporating almost nine pounds of water per pound of coal with natural draft and a medium grade of coal.

Yours very truly,

W. R. HANEY.

THOMPSON IRON WORKS,

Boiler Makers,

1825-27 Callowhill Street.

PHILADELPHIA, April 25, 1908.

THE CONTINENTAL IRON WORKS,

New York, N. Y.

DEAR SIRS:—Replying to your favor of the 24th regarding Continental Boiler installed two years ago, would say that this boiler is very satisfactory. Coal consumption and repair bills have been reduced to a point which is very gratifying to us.

The boiler requires very little room and attention, which, with its high efficiency, makes it the Ideal Boiler for a manufacturing plant.

Respectfully yours,

THOMPSON IRON WORKS,

W. W. Posey, *Mg'r.*

THOMPSON IRON WORKS,

Offices, 1825-27 Callowhill Street.

PHILADELPHIA, December 23, 1911.

THE CONTINENTAL IRON WORKS,

West & Calyer Sts.,

New York (Borough of Brooklyn).

GENTLEMEN:—Replying to your favor of December 21st, on July 29th, 1906, we installed our Internally Fired Scotch Marine Boiler containing Morison Furnace.

Would state this boiler has given us perfect satisfaction. It is a powerful steamer and economical. The furnace up to this writing has not cost us anything for repair.

Wishing you the compliments of the season, we are,

Yours very respectfully,

THOMPSON IRON WORKS.

Thos. Thompson.

Long Distance Telephone 722.

SMITH & CAFFREY.

SYRACUSE, N. Y., April 23, 1908.

THE CONTINENTAL IRON WORKS,

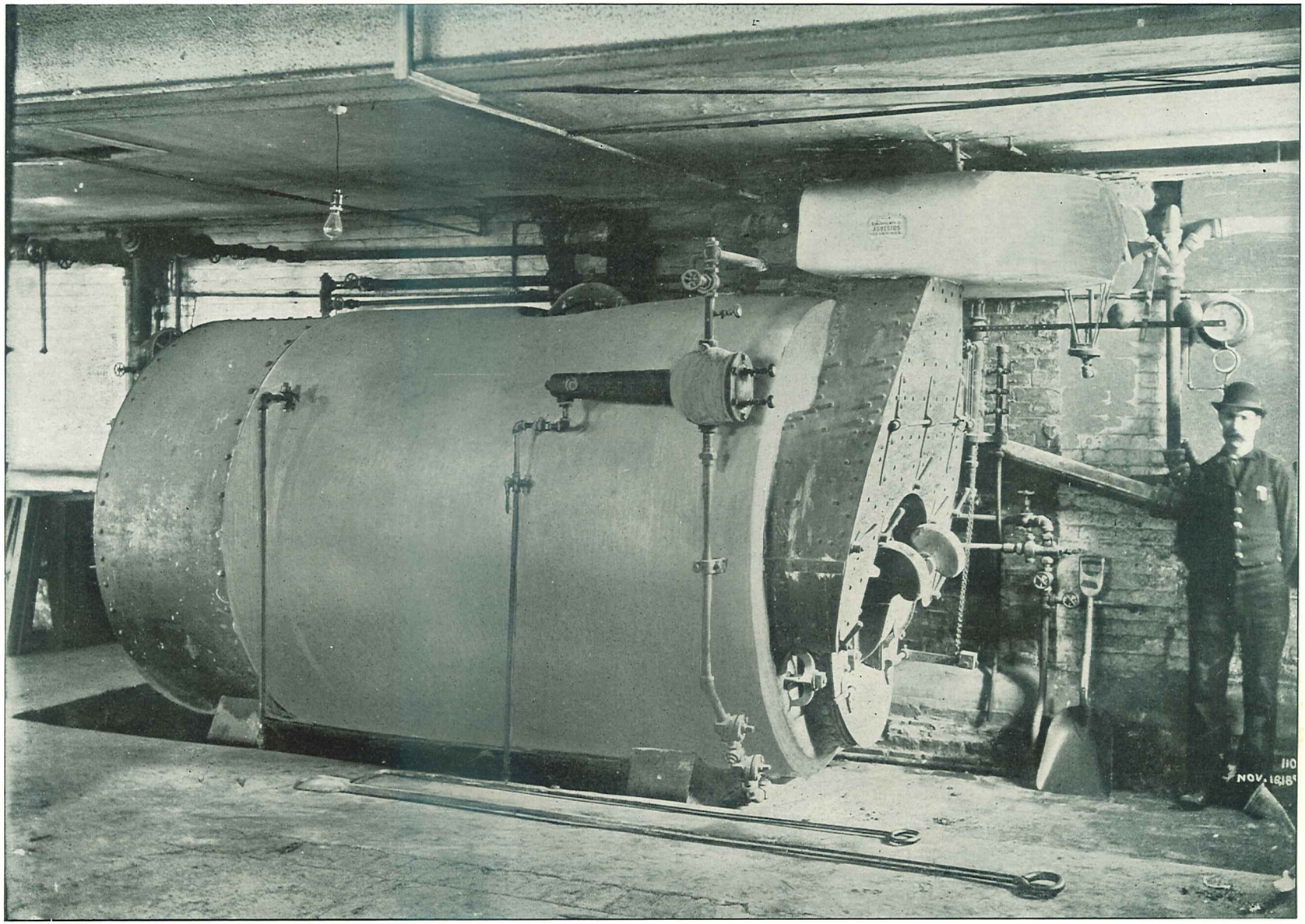
Brooklyn, N. Y.

GENTLEMEN:—We have been using one of your 100 H. P. Boilers for about five years, and have not had to spend one dollar for repairs. We use it to run five engines, and also for heating purposes. It is a good steamer, and very easy to keep clean.

Yours very truly,

SMITH & CAFFREY COMPANY,

Jas. S. Caffrey.



INTERNAL FURNACE BOILER FOR HEATING PURPOSES,
LOCATED IN CELLAR OF OFFICE BUILDING.

TESTIMONIALS.

CITY OF HASTINGS,

Water, Light and Sewer Department.

HASTINGS, Neb., Jan. 9th, 1912.

THE CONTINENTAL IRON WORKS,
West & Calyer Streets,
New York.

GENTLEMEN —pl to yours of the 20th of December with re ir ion of the Internal Furnace Boilers " li service, beg to advise, that we are ve ith the results that we have had from ace Boilers equipped with six ees, 40" I. D. x 12' long which gfield Boiler Mfg. Co. These have or about twelve years and with the ee or four new flues have had no repairs. ng two water tubes which we have had replace them with boilers of this type. itself.

letter will be of any service to u are at lib use it.

Respectfully yours,
CITY OF HASTINGS, Light Dept.,
C. R. Morey.

DEPARTMENT OF WATER D SEWERS,

City of sb"

Office, 711 Asbury Aven
Telephone 18 L. **L. Coffin, Superintendent.**

ASBURY PARK, N. J., April 22, 1908.

THE CONTINENTAL IRON WORKS,
Brooklyn, N. Y.

GENTLEMEN:—When the necessity for a new boiler confronted us in 1905 we made a very careful investigation into the various types available with a view of obtaining the best for our work. Our experience with water tubes had not been entirely satisfactory, and we were led to look for a simpler type that would combine the essentials of a first-class boiler.

We selected the Continental and installed the first 200-h.p. boiler two years ago. The third one of the same type and power is now on the sidetrack at our pumping station ready for setting up, and this will complete a 600-h.p. battery of Continental internal furnace boilers of which we are already proud.

We have found them to be of high efficiency, easy to handle, easy to clean and altogether satisfactory.

Very truly yours,
JNO L. COFFIN,
Supt. Dept. of Water and Sewers.

THE HENRY G. THOMPSON & SON COMPANY,

6 Elm St., Corner of State Street.

NEW HAVEN, Conn., Nov. 1st, 1902.

THE CONTINENTAL IRON WORKS,
West & Calyer Sts.,
Brooklyn, N. Y.

GENTLEMEN:—In September, 1901, being limited as to floor space in our boiler room, we put in one of your 100 H. P. "CONTINENTAL" Welded Steel Internally Fired Boilers with corrugated furnace, to heat and furnish power for our plant; it has proved satisfactory and economical, far beyond our expectations, having cost us less for coal to heat our building and furnish power (about 35 H. P.) for the last fourteen (14) months than it formerly did to heat the building for six (6) months without power. We cannot recommend it too highly.

Yours very truly,
THE HENRY G. THOMPSON & SON CO.,
George E. Haight, *Sec'y.*

The Wyllys Company, Owners. **Harry Hall, Manager.**

THE MADISON SQUARE,

37 Madison Avenue,

NEW YORK, April 18, 1908.

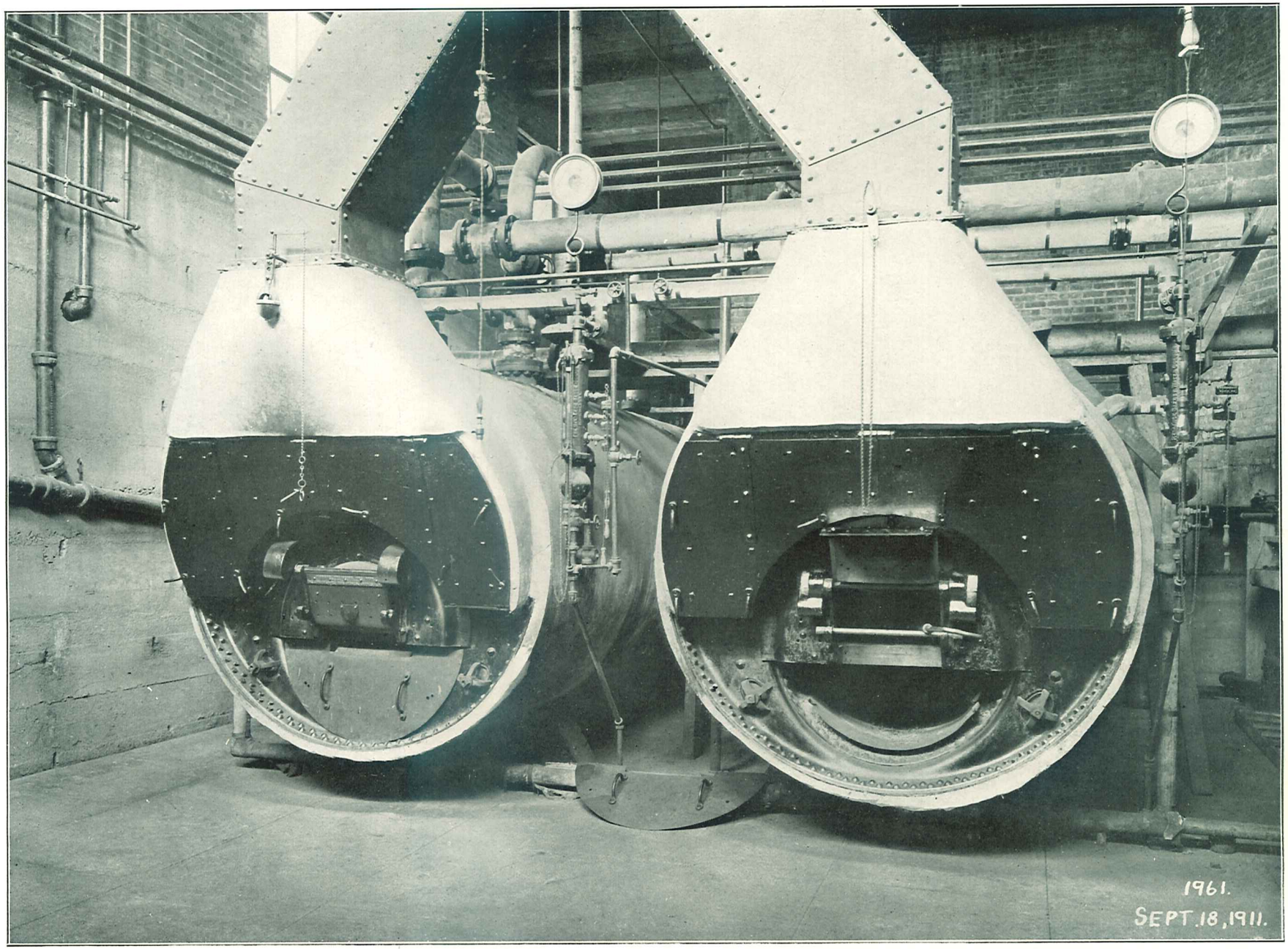
THE CONTINENTAL IRON WORKS,
Brooklyn, N. Y.

GENTLEMEN:—Yours of the 9th inst. received, and cheerfully give the information for use, you ask.

I have been in charge of the operating of two Continental Boilers, Morison Corrugated Furnaces, for the past two years. They have given us no trouble, and most satisfactory results, with no repairs to speak of. Our boilers are of the single furnace type, and are operated constantly, giving us but a few hours for cleaning. We are obliged to operate them one year without opening them, and one of the many good features, we find no dirt or scale deposited over the fires, it being always in the bottom, away from all harm, and I regard this as a most convincing argument in their favor.

We are always ready to show our boilers to any one who wishes to call, I remain,

Yours truly,
E. E. BRONNER,
Chief Engineer of the Madison Square.



BOILER PLANT, MOUNT ST. ALPHONSUS COLLEGE, ESOPUS, N. Y.

TESTIMONIALS.

CALLENDER, McAUSLAN & TROUP CO.

PROVIDENCE, R. I., January 2, 1912.

THE CONTINENTAL IRON WORKS,
West & Calyer Streets,
Brooklyn, N. Y.

DEAR SIRS:—Answering your recent inquiry, it gives us pleasure to state that the four Internal Furnace Boilers in our plant have given us excellent results.

The first three were installed in August, and started on Labor Day, 1897. One of the original three has never had a dollar expended upon the boiler proper; the other two have each had one tube replaced. The fourth boiler was installed in 1902, and has been used mostly in winter; but as it had to be kept full of water in order to be ready for an emergency, we had to renew the tubes in about five years' time, owing to corrosion.

Our primary object in selecting the internal furnace type of boiler was due to the fact that our head room and floor space was very limited, and we were enabled to install a greater number of horse-power than was possible with most other types.

We also believe that they should be fully as economical when new, and a great deal more efficient when old, than any type of brick-set boiler.

After an experience of fourteen years our expectations have been fully realized. The absence of brick work, except a small bridge wall and a few bricks in the combustion chamber, has made it unnecessary for us to have ever employed the services of a bricklayer for even one hour.

The boilers are much more easily cleaned and taken care of than any type of water-tube boiler, and as the fire does not come in contact with the external shell, there is neither the tendency to depreciation, nor the danger from an accumulation of scale on the sheets, that there is with boilers whose sheets come in contact with the fire.

After a number of years of experience with other makes of boilers, we are fully convinced that for high efficiency, low maintenance, and ease of operation, you cannot beat the internal furnace boiler.

Yours very truly,
CALLENDER, McAUSLAN & TROUP CO.,
Per Alex. Gordon, *Chief Engineer.*

MOUNT ST. ALPHONSUS.

ESOPUS, Ulster Co., N. Y., Sept. 29th, 1911.

THE CONTINENTAL IRON WORKS,

GENTLEMEN:—We have four 100 H. P. boilers with Morison Corrugated Furnaces, installed here in 1907.

We have been operating same with satisfaction ever since, and without one cent for repairs.

Yours respectfully,
F. J. REICHERT, C.S.S.R.

George L. Motley, Prest. & Gen. Mgr. — George W. Brothers, Treas. — R. M. Kellogg, Supt
Address reply to Gas Works, School & Rock Streets.

LOWELL GAS LIGHT COMPANY,

22 Shattuck Street.

LOWELL, Mass., April 18th, 1908.

THE CONTINENTAL IRON WORKS,
Brooklyn, N. Y.

DEAR SIRS:—In reply to your letter of April 16th, 1908, requesting our opinion of Continental Boilers, would say that we have three (3) 250 H. P. Continental Boilers installed in 1903 and have had no repairs on them to date.

One of these boilers is fitted for burning oil, using the W. N. Best System; we have used Oil Tar and Coal Tar under this boiler with great satisfaction.

The other two (2) boilers are fitted with the white Hollow Blast Grates, and we are burning the very finest Coke Breeze or Screenings.

We have burned all kinds of fuel under these boilers. Enclosed are some figures taken from a test made by Prof. Edward F. Miller, Mass. Inst. Technology, Oct. 25-26, 1904.

Kindly return these figures after you have examined them

Yours very truly,
R. M. KELLOGG, *Supt.*

E. W. EDWARDS & SON.

SYRACUSE, N. Y., April 29, 1908.

THE CONTINENTAL IRON WORKS,
Brooklyn, N. Y.

GENTLEMEN:—We have a two-hundred horse-power "Continental" boiler fitted with two Morison corrugated furnaces, built for us by the Springfield Boiler & Mfg. Co., of Springfield, Ill., about two years ago, and I recommended this type of boiler, after a thorough investigation of these boilers in many of the plants in this section.

We don't believe it would have been possible to have installed any other make of boiler of this size in the space allotted to same, and at the same time admit of thorough examination and possibility of cleaning all parts of the boiler.

I have run many kinds of boilers during my 25 years as an engineer, and believe this to be the best boiler I have used, and can cheerfully recommend same to prospective buyers as a safe, economical and easily handled boiler.

Yours respectfully,
E. W. EDWARDS & SON,
Per Geo. H. Wilson.

TESTIMONIALS.

Principal Office and Works,
43-53 Keap Street, B'klyn.

New York Sales Office,
154 Nassau Street,

Boston Sales Office,
30 Oliver Street.

M. T. Davidson Company,

Improved Steam Pumps, Pumping Engines, Condensers, Evaporators, Etc.

No 43-53 Keap Street.

BROOKLYN, May 14th, 1908.

THE CONTINENTAL IRON WORKS,

Brooklyn (Greenpoint), N. Y.

GENTLEMEN:—Replying to your inquiry in reference to the efficiency of the ten internal furnace boilers furnished by me, in connection with my contract to install pumping engines at the "Milburn Station" of the Brooklyn Water Works, I have respectfully to say: There are two batteries, consisting of five boilers each, and they have given the best satisfaction. Five of them have been in almost constant use for seventeen years, the other five have been in use for about fifteen years. The repairs during this time consisted of retubing the entire ten boilers last year. So entirely satisfactory has been my experience with the type of boilers which I furnished and caused to be erected at the pumping station above alluded to, that I could not be induced (of my own volition) to use, or recommend to others, any type of boiler not possessing the characteristics of the internal furnace boilers at "Milburn Pumping Station," for this type completely dispenses with carefully prepared foundations and the ordinary surrounding walls of brick. The iron furnace front, the buckstays, tie-rods, etc., all of which are necessary to the setting of stationary boilers with external furnaces, and which are adjuncts constantly liable to become disarranged, thereby involving much inconvenience and loss, creating large expenses in frequent repairs. In this latter type of boiler the mass of brickwork so closely surrounds the sides and top of the cylindrical portion as to preclude perfect inspection, and causing difficulty in the making of repairs. Whereas the Internal Furnace type of boiler can be critically examined and repaired (if occasion requires) with the utmost facility.

Again, referring to the boilers and pumping engines at the "Milburn Pumping Station," I am pleased to say that while working under the very low head of 52 feet maximum, and delivering nearly 40,000,000 gallons of water per day of twenty-four hours, the engines developed an economic duty of 92,000,000 foot pounds for each 100 pounds of coal consumed, evidencing an evaporation of at least ten pounds of water for every pound of coal supplied to the furnaces. A result very much better than I have before known to be accomplished by the use of any other type of boiler, and I have had much experience, as there are over four hundred boilers in the United States which I have built and placed in service.

Very truly yours,

M. T. DAVIDSON,

President.

Note picture of this plant on opposite page.

CITY WATER WORKS,

MINNEAPOLIS, Minn., April 16th, 1908.

THE CONTINENTAL IRON WORKS,

Brooklyn, N. Y.

GENTLEMEN:—In reply to your favor of recent date, asking for my opinion of the Continental Boilers fitted with Morison Corrugated Furnaces in our Camden Park Pumping Station, I am pleased to state:

The battery of boilers were installed in 1890, and in continuous use from that time until 1905, a period of fifteen years, twenty-four hours per day, equal to thirty years' service, with an expenditure of less than One Hundred Dollars on the entire battery from the time they were first installed up to the present date

Since 1905 our new pumping station has been in service, and the Camden Park Station, in which the Continental Boilers are installed, is used as a reserve plant and is not in commission continuously.

Our former Chief Engineer, the late Mr. Andrew Bergstrom, always spoke in highest terms of the Continental Boilers, and wrote you a letter, which I believe was printed in your 1905 catalogue.

I can heartily endorse his letter of that date, only adding the additional years of their term of service, with, I might say, *no* repairs. When, as I stated in this letter, less than One Hundred Dollars had been expended, this sum does not cover grate bars, water glasses or manhole gaskets, however.

You are at liberty to publish this letter in your catalogue as you see fit, and I sincerely hope it will prove beneficial.

Yours sincerely,

J. H. MCCONNELL,

Supervisor.

J. H. McConnell, Acting Supervisor,

CITY WATER WORKS,

Minneapolis, Minn.

THE CONTINENTAL IRON WORKS,

New York.

DEAR SIRS:—Your letter of December 21st, 1911, received, about your Internal Furnace Boilers and whether we were still of the same opinion about them.

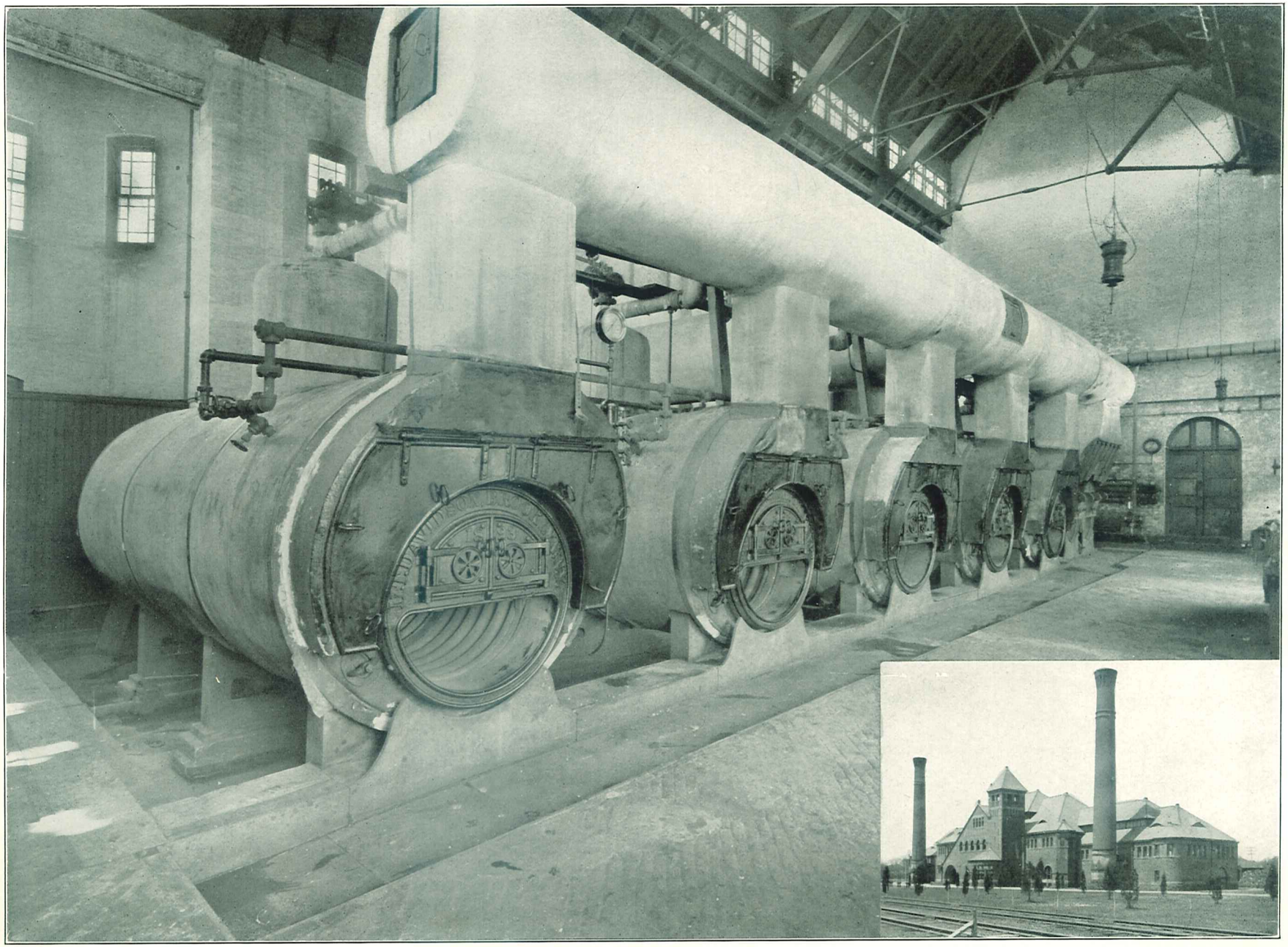
I would say yes, we have had them under steam and run the greater part of the time, and find the service as good as at the first time, and the repairs have been so small that we consider them as nothing. There has been no trouble and when called on they were "there."

I see no reason to change my opinion in any particular, as to their efficiency.

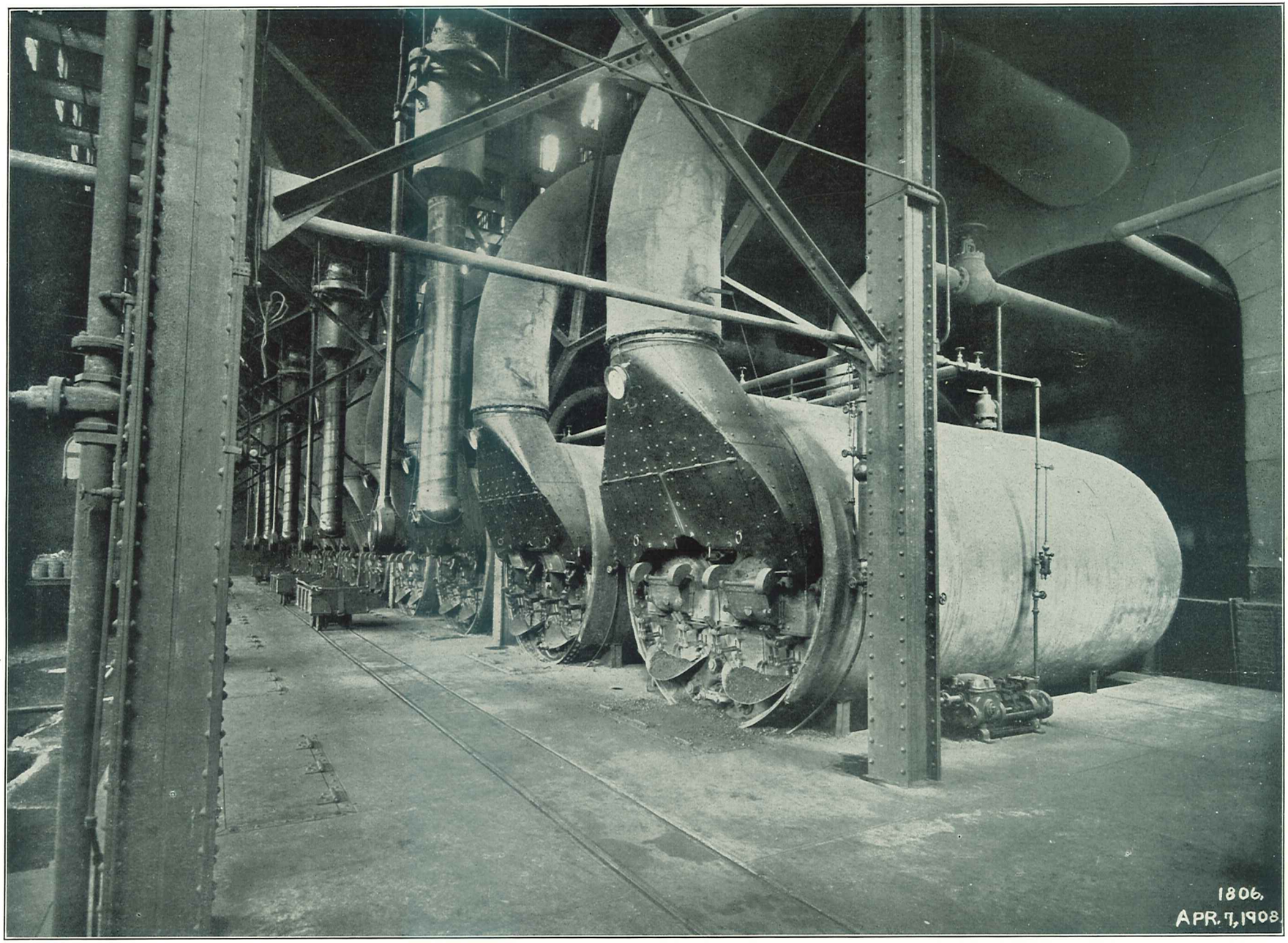
Resp.,

J. H. MCCONNELL,

Dec. 26, 1911. *Act. Supervisor.*



BATTERY OF INTERNAL FURNACE BOILERS, MILBURN PUMPING STATION,
BROOKLYN WATER WORKS, LOCATED AT BALDWIN, LONG ISLAND, N. Y.



BOILER PLANT, FONDA, JOHNSTOWN & GLOVERSVILLE R. R. CO., TRIBES HILL N. Y.

TESTIMONIALS.

FONDA, JOHNSTOWN & GLOVERSVILLE RAILROAD CO.

TRIBES HILL, N. Y., April 14th, 1908.

THE CONTINENTAL IRON WORKS,

Brooklyn, N. Y.

GENTLEMEN:—Replying to your inquiry regarding our Continental Boilers, would say:—

The Fonda, Johnstown & Gloversville Railroad Co. installed a battery of ten Continental Boilers in our plant at Tribes Hill, New York, which have been in constant operation for the past five years, four years of that time under my personal charge.

I find the boilers require very little attention and practically no repairs. While we are developing a maximum of four thousand horse power on eight of the boilers we never require but three firemen, and generally run the plant with only two firemen.

In the regular operation we handle the entire boiler plant with seven men for three shifts of eight hours each, these seven men do all the cleaning, firing, repairing and coal handling at the plant.

We are developing a Kw. per three pounds of Penn'a. slack coal every day in the year, which equals a horse-power on about 2¼ pounds.

I have in the past twenty years handled different types of boilers, from high-grade water tube down to the horizontal return tubular boilers, and am firmly convinced that I have a boiler plant specially adapted for heavy continuous service, and if I were to purchase more boilers would advocate the same type and kind, and heartily recommend same to purchasers desirous of securing efficient, durable boilers, at the same time eliminating the annoyance and expense of repairs to brick settings.

I hope the pictures of the boiler room and power-house will give you a good idea of our plant.

Yours truly,

C. L. GATES,

Chief Eng'r. of Power Sta.

FONDA, JOHNSTOWN & GLOVERSVILLE RAILROAD CO. POWER STATION.

TRIBES HILL, N. Y., Dec. 26th, 1911.

THE CONTINENTAL IRON WORKS,

Brooklyn, N. Y.

GENTLEMEN:—We are now using nine of the ten Continental type 300 H. P. boilers installed eight or nine years ago, and they are practically as good as new.

While we are developing a maximum of five thousand horse power on nine of them, we never require but three firemen, using a little more than two pounds of soft coal per horse-power.

Nine men working eight hours each do all the firing, cleaning, repairing and coal handling at the plant.

Yours truly,

C. L. GATES,

Chief Engr. of Power Station.

THE FLORAL EXCHANGE, INC.,

Main Office, North Wales. Pa.

EDGELY, Bucks County, Pa., Dec. 29th, 1911.

THE CONTINENTAL IRON WORKS,

GENTLEMEN:—In answer to yours of the 20th inst., I would say that for 37 years I have been using steam generated from different build of boilers. It has been my duty to produce the necessary steam required with the least consumption of coal possible. I found I could do this with Internal Furnace Boilers, and consequently for the past 17 years have used only Internal Furnace Boilers. Other make of boilers may be more cheap to install as to first cost, but the added H. P. needed and the increased cost of coal consumed to produce the steam required soon mean an expensive steam plant. The Internal Furnace Boiler is in a class by itself.

Yours resp.,

(Signed) HARRY SIMPSON.

KRATZER CARRIAGE CO.,

First Street, from Vine to Market.

DES MOINES, Iowa, May 7th, 1908.

J. G. ROBERTSON,

St. Paul, Minn.

DEAR SIR:—Replying to yours of the 5th, yes, we are using one of the Marine Type Boilers, 150 Horse Power. We have used this for two years. We think it has saved for us at least one-third of our coal bill, and as it is our intention to put in another boiler, a 75 Horse Power, in a short time, we expect to purchase the same type, as we believe it the best boiler that we could purchase.

Yours very truly,

KRATZER CARRIAGE COMPANY,

J. F. Kratzer, *Prest.*

KRATZER CARRIAGE CO.,

Wholesale Vehicle Makers,

First Street, from Vine to Market.

DES MOINES, Iowa, December 23d, 1911.

CONTINENTAL IRON WORKS,

New York, N. Y.

GENTLEMEN:—The Morison Suspension Boilers, marine type, that we installed some seven years ago, are in the very best of condition to-day. We have been well pleased with these boilers in every particular. They are fuel savers and we have reduced our fuel expense almost one-half since we began using this type, and with the exception of a few new tubes, we have had practically no repairs at all and cannot see but what they are good for several years to come.

Yours truly,

KRATZER CARRIAGE CO.,

C. S. Walker, *Pres. & Treas.*

TESTIMONIALS.

WORTH BROS. COMPANY.

COATESVILLE, Pa., U. S. A., May 15, 1908.

THE CONTINENTAL IRON WORKS,
Brooklyn, N. Y.

GENTLEMEN:—In reply to your inquiry as to the performance of Continental Boilers, would say we have been using them now for several years and have at present seventeen in use, all made according to your 250 H. P. type but lengthened out sufficiently to equal 300 H. P. They have all given us excellent satisfaction; the repairs have been practically nothing. We consider them very efficient and where it is necessary to force them in order to make an extra quantity of steam, we are not afraid to give them all the draught and coal possible. On twelve of them we have stacks one hundred and eighty feet high which gives us a powerful draught in case we want to force the boilers hard. We have never seen any bad effects from hard firing.

Yours very truly,
J. S. WORTH, *Prest.*

WORTH BROTHERS COMPANY.

COATESVILLE, Pa., December 29, 1911.

THE CONTINENTAL IRON WORKS,
Brooklyn, N. Y.

GENTLEMEN:—Answering your recent inquiry regarding our seventeen 300 H. P. Continental boilers, we can now, after a further continued hard service of three years and a half, most unhesitatingly confirm all we said about them in our letter of May 15th, 1908, and might further add, our experience has proved that they combine all the desirable qualities of a boiler without a single bad one.

Very truly yours,
WORTH BROS. CO.,
By J. S. Worth, *Pres.*

Office of

W. A. TAYLOR,

Chairman County Court and Financial Agent Shelby County.

MEMPHIS, Tenn., Jan. 24, 1912.

THE CONTINENTAL IRON WORKS,
New York.

GENTLEMEN:—In compliance with your request of Dec 20, 1911, as to the performance of the three Internal Furnace Boilers installed in the Shelby Co. Court House, of which I have had charge for the past twenty-seven months, will say, they are the best constructed and most economical of any boilers I have had under my charge in my forty years' experience as an engineer.

Respectfully,
J. M. PRESCOTT, C. E.

CITY OF ROCHESTER,

Department of Engineering

Edwin A. Fisher, City Engineer.

ROCHESTER, N. Y., April 29, 1908.

MESSRS. BARR & CREELMAN,
24 Exchange Street,
Rochester, N. Y.

GENTLEMEN:—The two 250 H. P. internal fired Continental Boilers which you installed for us in 1904 were tested by Professor Allen S. Crocker, M. E., of this city, December 18th, 1904. The duration of the test was twelve hours and the steam gauge pressure averaged 85.4 lbs. The efficiency of the boiler, that is, heat absorbed per lb., combustible ÷ heat value of one lb. of combustible = 72.8%.

The boilers have continued to give satisfaction, and Mr. J. C. McNab, the Engineer in charge of the station, expresses himself as well pleased with the installation, and states that if new boilers were to be furnished at this time, he would prefer the same type.

Yours very truly,
E. A. FISHER,
City Engineer.

J. S. SCHOFIELD'S SONS CO.

MACON, Ga., February 9th, 1912.

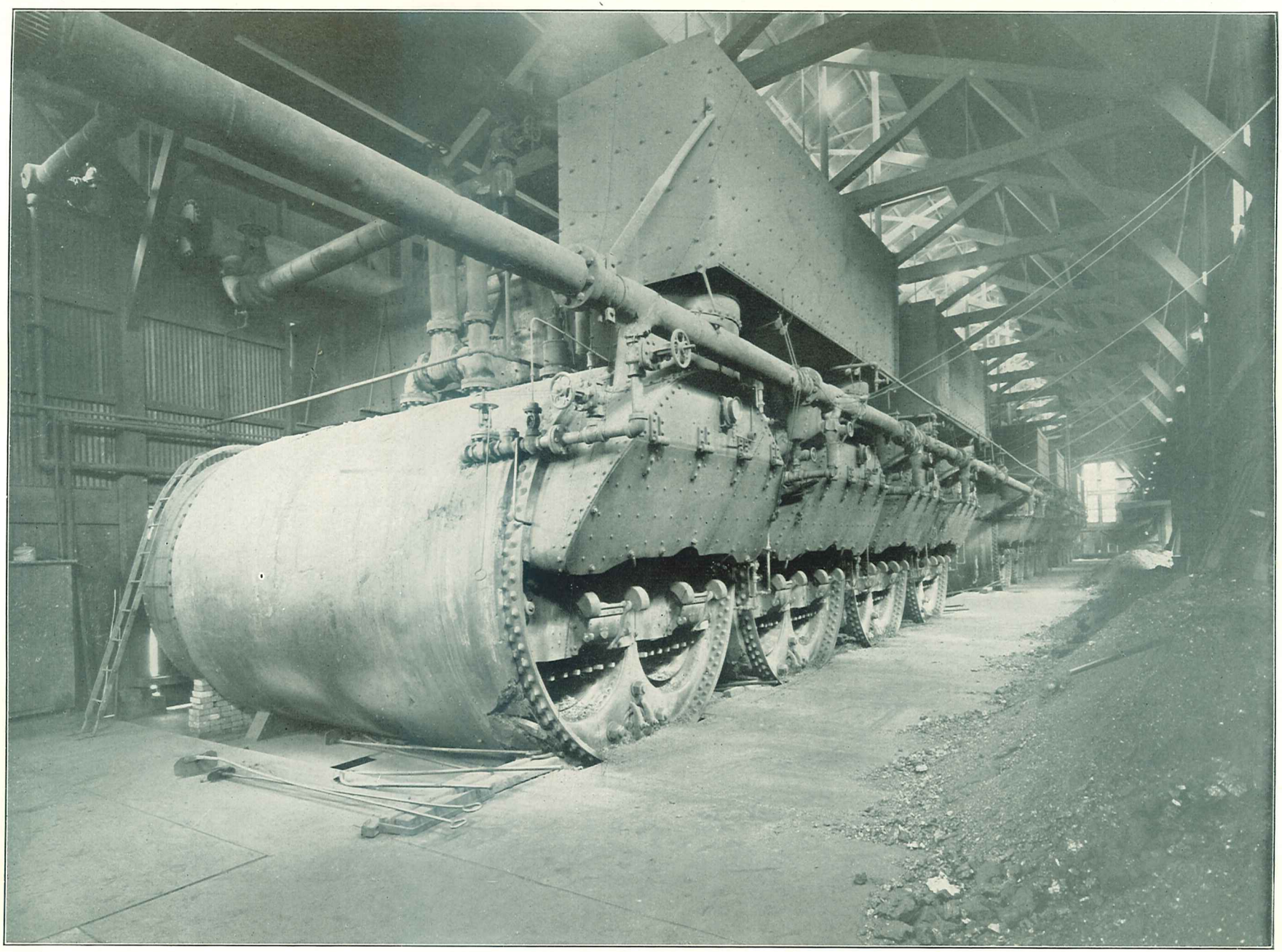
THE CONTINENTAL IRON WORKS,
New York, N. Y.

GENTLEMEN:—In regard to the internal furnace boilers, with Morison suspension furnaces, which we have in use, we would advise that we have 2—125 H. P. type A boilers, built for 130-lb. pressure, which have been in continual service now for nearly ten years. These boilers are still in good condition and likely to last many years longer. The cost of repairs has been very small and we have never been obliged to shut down on account of boiler trouble.

These boilers have also proved satisfactory from an economical standpoint in the consumption of coal.

We operate a Corliss engine and generator with these boilers, also an air compressor and a steam pump, and the cost of power has been such as that local hydro-electrical companies have not been able to offer us a proposition which would give us cheaper power than we are making for ourselves.

Yours truly,
J. S. SCHOFIELD'S SONS CO.,
Percy Jackson, *Engineer.*



BOILER PLANT, WORTH BROS. CO. COATESVILLE, PA.

TESTIMONIALS.

Office of

MARCUS ROSENBLOOM,

Salina & Fayette Sts.

Syracuse, N. Y., April 10th, 1908.

The Continental Iron Works,

Brooklyn, N. Y.

Gentlemen:—In reply to your inquiry, I am pleased to state that I installed a Standard Type B Continental Boiler at the time I constructed my building two years ago at the corner of South Salina and East Fayette Streets in our city.

I find same eminently satisfactory both from the standpoint of economy and efficiency.

The boiler was built by Mack Bros., Syracuse, N. Y., and is fitted with "Herrick Shaking Grates," which I consider a valuable feature as well.

At the time, when looking about to purchase a boiler, I investigated different types and makes, and concluded on the one I installed. I am satisfied that I made a wise choice. Being pleased to furnish you with this information,

I beg to remain,

Very respectfully yours,

Marcus Rosenbloom.

La Crosse, Wis., Aug. 13, 1900.

Joseph T. Ryerson & Son,

Chicago, Ill.

Gentlemen:—Your several communications under date of July 28-31 and August 9 have been received.

Replying in a general way we will say we are well pleased with the Internally Fired Boiler made for us some years ago by Solberg & Son, of this city, fitted with the Morison Corrugated Furnace. So much so, that we intend replacing our present return tubular boilers with more of the same type at the first practical opportunity. We regret to say that we have no photograph of this boiler in place and no specific figures which we can present illustrating the economy of the boilers in the use of fuel. A test made when the boiler was set, using wood, showed a saving of about 25 per cent. over the return tubular boilers then in use.

We understand that the Homestead Mining Company of Lead, S. D., who placed an order with the manufacturers of our boiler for eight of the same type soon after ours was set, have ordered five more, which are now being manufactured and which are to replace their water tube boilers now in use.

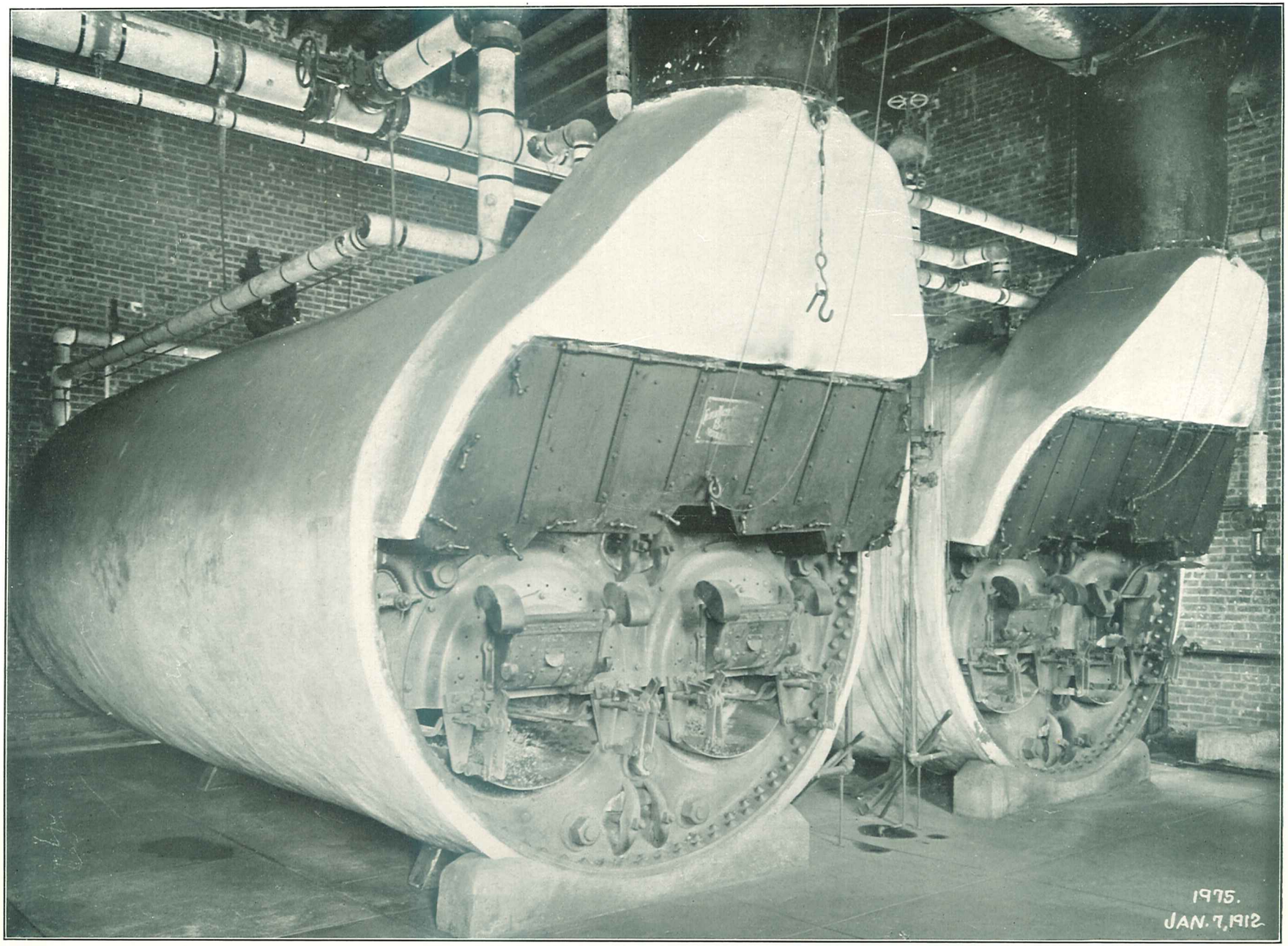
We regard this fact as a more convincing argument in favor of the Internally Fired Boiler than any which we could put forth from our own experience.

Yours truly,

Edison Light & Power Co.,

By C. H. Greenwood, *Gen'l Supt.*

VIEW AT THE CONTINENTAL IRON WORKS, NEW YORK, N. Y.



BOILER PLANT, ROCKVILLE CENTRE WATER WORKS, ROCKVILLE CENTRE, L. I., N. Y.

Partial List of Installations of Internal Furnace Boilers Fitted with Corrugated Furnaces of The Continental Iron Works manufacture, used for Stationary Purposes.

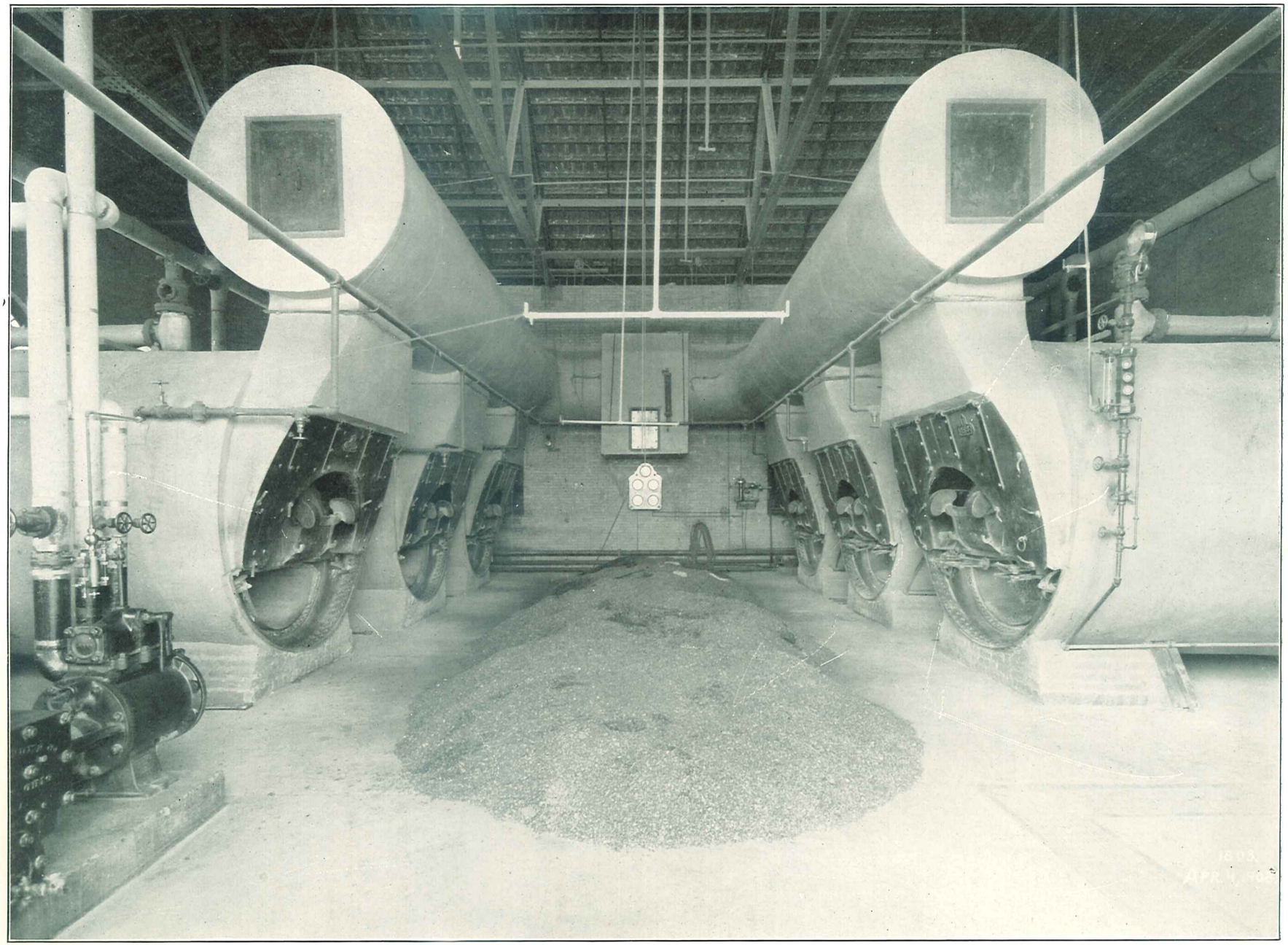
Municipal Plants, Water Works and Electric Lighting.

- The Albuquerque Gas, Electric Light & Power Co., Albuquerque, N. Mex.
- Amory Light & Power Co. ..... Amory, Miss.
- Department of Water & Sewers. . Asbury Park, N. J.
- Atchison Railway, Light & Power Co., Atchison, Kan.
- Batavia Water Department. ..... Batavia, N. Y.
- Montana Water Co. ..... Billings, Mont.
- City Water Works. ..... Boone, Ia.
- The City Water Co. ..... Bowling Green, Ohio.
- Water Department. ..... Brooklyn, Mich.
- Charlotte Water Works. ..... Charlotte, Mich.
- Chicago Water Works. ..... Chicago, Ill.
  - Central Park Ave. Station.
  - Chicago Ave. Pumping Station.
  - Springfield Ave. Pumping Station.
  - Lake View Pumping Station.
  - Fourteenth Street Pumping Station.
- Corry City Electric Light Co. .... Corry, Pa.
- Broadway Pumping Station. ..... Council Bluffs, Ia.
- North 37th Street Station. ..... Council Bluffs, Ia.
- Danville Water Works. ..... Danville, Ills.
- East Chicago & Indiana Harbor Water Co., East Chicago, Ind.
- Elkhorn Light & Water Commission, Elkhorn, Wis.
- El Paso, Electric Light Co. ..... El Paso, Ill.
- Electric & Water Co. ..... Grand Rapids, Wis.
- Henderson Light & Power Co. . Greenville, Ala.
- The Hannibal Water Co. ..... Hannibal, Mo.
- City Electric Light Plant. ..... Hastings, Neb.
- Havre Electric Co. ..... Havre, Mont.
- Hot Springs Water Co. ..... Hot Springs, Ark.
- Jellico Electric Light, Heat & Water Power Co., Inc., Jellico, Tenn.
- Electric Light & Water Works. . Kasson, Minn.
- La Crosse Gas & Electric Co. .... La Crosse, Wis.
- La Crosse City Railway Co. ..... La Crosse, Wis.
- City Water Works and Electric Light Plant, La Fayette, La.
- Electric Light Plant. ..... Lansing, Mich.
- City Plant. ..... Lorain, Ohio.
- Maywood Water Works. ..... Maywood, Ills.
- Milburn Electric Co. ..... Milburn, N. J.
- Camden Park Pumping Station. . . Minneapolis, Minn.
- Water Supply. ..... City of New York.
  - Jerome Park Pumping Station.
  - 97th Street Pumping Station.
  - Milburn Pumping Station.
  - Canarsie Pumping Station.
  - Ridgewood Pumping Station.
  - Mt. Prospect Pumping Station.
- Ashley Electric Co. ..... Morrillton, Ark.
- New Haven Water Co. ..... New Haven, Conn.
- Newport News Light & Water Co. Newport News, Va.
- North Andover Water Works. .... North Andover, Mass.
- Northwood Electric Light & Power Co., Northwood, Ia.
- Oshkosh Water Works Co. ..... Oshkosh, Wis.
- Paducah Water Co. ..... Paducah, Ky.
- Philadelphia Water Works. ..... Philadelphia, Pa.
  - Spring Garden Pumping Station.
  - Belmont Pumping Station.
  - Belmont High Service.
  - Queen Lane Pumping Station.
  - Roxborough Pumping Station.
  - Roxborough High Service.
  - Frankford Pumping Station.
  - Frankford High Service.
- Pueblo Water Works. ..... Pueblo, Colo.
- City Water Works. ..... Rochester, N. Y.
- Shawnee Gas & Electric Co. ..... Shawnee, Okla.
- Water and Light Department. ... Sherman, Tex.
- Municipal Plant ..... Spring Lake, N. J.
- Electric Light & Water Department, Warren, Minn.
- Washburn Electric Light & Power Co., Washburn, Wis.
- Water Department. ..... Waukegan, Ill.
- Combined Water & Sewage Plant, Winona, Minn.
- Water Works. ..... Youngstown, Ohio.
- Amarillo Water, Light & Power Co., Amarillo, Tex.

Public Institutions.

- Isthmian Canal Commission. ..... Isthmus of Panama.
- U. S. Government Indian School. . Tomah, Wis.
- Department of Agriculture ..... Washington, D. C.
- U. S. Government Printing Office, Washington, D. C.
- U. S. Government Stone Quarry. . West Point, N. Y.
- Board of Education. ..... St Joseph, Mo.
- Ursuline Academy. ..... Dallas, Tex.
- St. Vincent's Home. ..... Philadelphia, Pa.
- Mt. St. Alphonsus College. ..... Esopus, N. Y.
- Michigan Agricultural College. . East Lansing, Mich.
- University of Tennessee. ..... Knoxville, Tenn.
- State Penitentiary. ..... Lincoln, Neb.
- Department of Corrections. ..... New York, N. Y.
  - Blackwell's Island Workhouse.
- Onondaga County Penitentiary. . Jamesville, N. Y.
- Department of Charities. ..... New York, N. Y.
  - City Hospital, Blackwell's Island.
  - Metropolitan Hospital, Blackwell's Island.
  - Brooklyn Hospital.
- Monroe County Power House. .... Rochester, N. Y.
- Dr. Moritz Sanitarium. ..... Edgely, Pa.
- The Hartford Retreat. ..... Hartford, Conn.
- Northern Hospital for Insane. . . Hastings, Neb.
- New Jersey State Hospital. ..... Morris Plains, N. J.
- Essex County Asylum. ..... Overbrook, N. J.
- Lutcher Memorial Church. ..... Orange, Tex.
- St. Joseph's Hospital. ..... Philadelphia, Pa.
- St. Elizabeth's School. ..... Philadelphia, Pa.

(• Indicates repeat order.)



BOILER PLANT, CITY HOSPITAL, BLACKWELL'S ISLAND, NEW YORK CITY.

Partial List of Installations—continued.

Public Institutions—Continued.

Women's & Children's Hospital..Syracuse, N. Y.
Homeopathic Hospital.....Syracuse, N. Y.
Belasco Theatre.....Washington, D. C.

Gas Companies.

•Consolidated Gas Co.....New York, N. Y.
The Brooklyn Union Gas Co.....Brooklyn, N. Y.
•Worcester Gas Light Co.....Worcester, Mass.
Lowell Gas Light Co.....Lowell, Mass.
Elizabethtown Gas Light Co....Elizabeth, N. J.
•St. Paul Gas Light Co.....St. Paul, Minn.
La Clede Gas Co.....St. Louis, Mo.
Hillsboro Electric & Gas Co.....Hillsboro, Tex.

Hotels, Store and Office Buildings.

The Madison Square Apartment House, New York, N. Y.
Albany Hotel.....New York, N. Y.
Broadway Improvement Co.....New York, N. Y.
Colony Club.....New York, N. Y.
Eimer & Amend.....New York, N. Y.
Portland Block Apartment Hotel, St. Paul, Minn.
Harris Emery Co.....Des Moines, Iowa.
Burton-Peel Dry Goods Co.....Fort Worth, Tex.
Merchants Nat'l Bank Building.Fort Smith, Ark.
H. P. Wasson & Co.....Indianapolis, Ind.
Burnham-Hanna-Munger Co.....Kansas City, Mo.
John Taylor Dry Goods Co.....Kansas City, Mo.
•Hotel Savoy.....Kansas City, Mo.
O. McClintock Co.....Pittsburg, Pa.
•Callendar, McAusland & Troop Dry Goods Co., Providence, R. I.
Crown Hotel.....Providence, R. I.
Industrial Trust Co.....Providence, R. I.
Michaels, Stern & Co.....Rochester, N. Y.
Richardson-Roberts Dry Goods Co., St. Joseph, Mo.
Dey Bros. Co.....Syracuse, N. Y.
Gridley Office Building.....Syracuse, N. Y.
E. W. Edwards & Sons.....Syracuse, N. Y.
Syracuse Dry Goods Co.....Syracuse, N. Y.
M. Rosenbloom Building.....Syracuse, N. Y.
New Oliver Building.....Boston, Mass.
Overland Building.....Boise, Idaho.
White Building.....Buffalo, N. Y.
Electrical Building.....Chicago, Ills.
Great Northern Building.....Chicago, Ills.
•L. J. McCormick Estate.....Chicago, Ills.
Majestic Theatre.....Chicago, Ills.
Old Colony Building.....Chicago, Ills.
Schiller Building.....Chicago, Ills.
Tribune Building.....Chicago, Ills.
Temple Court Building.....Denver, Colo.
Iowa Loan & Trust Building.....Des Moines, Iowa.
Western National Bank.....Fort Worth, Tex.
Young Men's Christian Association, Houston, Tex.
•Chambers of Commerce Building..Minneapolis, Minn.
National Bank of Commerce Building, Norfolk, Va.
Ellwood Building.....Rochester, N. Y.
Kohl Building.....San Francisco, Cal.
Masonic Temple.....Washington, D. C.

Mines and Mining.

•Assumption Coal & Mining Co...Assumption, Ill.
Central Phosphate Co.....Beaufort, S. C.
•Copper Queen Cons. Mine Co.....Bisbee, Ariz.
•Calumet & Arizona Mining Co...Bisbee, Ariz.
Lake Superior & Pittsburg Mining Co., Bisbee, Ariz.
Calumet & Pittsburg Mining Co..Bisbee, Ariz.
W. A. Clark Mines.....Butte, Mont.
Davis-Daly Estate Copper Co....Butte, Mont.
•Butte & Superior Copper Co.....Butte, Mont.
Big Four Wilmington Coal Co....Chicago, Ills.
Big Four Wilmington Coal Co....Coal City, Ills.
•The Arizona Copper Co., Ltd.....Clifton, Ariz.
Shoal Creek Coal Co.....Donnellson, Ills.
•Champion Copper Co.....Freda, Mich.
The Western Alkali Co.....Green River, Wyo.
Gunn Quealy Coal Co.....Gunn, Wyo.
Republic Iron & Steel Co.....Gilbert, Minn. (Schley Mine.)
The Helvetia Copper Co.....Helvetia, Ariz.
•The Tod-Stambaugh Co.....Hibbing, Minn.
•Peace River Phosphate Co.....Hull, Fla.
Cananea Consolidated Copper Co.La Cananea, Mex.
•Fox Coal Co.....Montague, Tenn.
Florida Mining Co.....Mulberry, Fla.
American Smelting & Refining Co,. Murray, Utah.
•Moctezuma Copper Co.....Nacozari, Mex.
Saginaw Mining Co.....Norway, Mich.
The Cleveland Cliffs Iron Co....Princeton, Mich.
Union Pacific Coal Co.....Rock Springs, Wyo.
Red Mountain M. & T. R. R. Co...Silverton, Colo.
Illinois Central Coal & Salt Co.St. John, Ills.
•The Superior Coal Mining Co. of Wyoming, Superior, Wyo.
Princeton Mining Co.....Swazy, Mich.
Southern Arizona Smelting Co...Sasco, Ariz.
•The Tombstone Cons. Mines Co., Ltd., Tombstone, Ariz.
Compania Metallurgica Mexicana, Torreon, Mex.

Iron Works, Implement Manufacturers and Machine Shops.

•U. S. Cast Iron Pipe & Foundry Co., Anniston, Ala.
Challenge Co.....Batavia, Ills.
Southern Well Works Co.....Beaumont, Tex.
Beaver Dam Malleable Iron Co..Beaver Dam, Wis.
Harrison Machine Works.....Belleville, Ills.
•The Continental Iron Works....Brooklyn, N. Y.
Bishop & Babcock.....Chicago, Ills.
•Worth Bros. Co.....Coatesville, Pa.
The Morris County Machine & Iron Co., Dover, N. J.
James Gurney & Co.....East Boston, Mass.
Gillette Roller Bearing Co.....Grand Rapids, Mich
The Janesville Machine Co. ....Janesville, Wis.
•Thos. B. Jeffrey & Co.....Kenosha, Wis.
•Northern Electric Co.....Madison, Wis.
Marseilles Mfg. Co.....Marseilles, Ills.
Wilcox, Crittenden & Co., Inc....Middletown, Conn.
•Pawling & Harnischfeger.....Milwaukee, Wis.
The Henry G. Thompson & Sons Co., New Haven, Conn.
John F. Allen.....New York, N. Y.

(• Indicates repeat order.)

Partial List of Installations—continued.

Iron Works, Implement Manufacturers and Machine Shops—Continued.

Francis Keil & Sons.....New York, N. Y.
Washburn Wire Co.....New York, N. Y.
Challoner Co.....Oshkosh, Wis.
J. I. Case Plow Works.....Racine, Wis.
Higgins Spring & Axle Co.....Racine, Wis.
•Mitchell Motor Car Co.....Racine, Wis.
Racine Engine & Machinery Co..Racine, Wis.
•La Belle Iron Works.....Steubenville, Ohio.
Wyeth Hardware & Mfg. Co.....St. Joseph, Mo.
Whitman Agricultural Co.....St. Louis, Mo.
Hauser Elevator Co.....Syracuse, N. Y.
Smith & Caffrey Co.....Syracuse, N. Y.
•New Winona Mfg. Co.....Winona, Minn.

Boiler Shops.

Franklin Machine & Steam Boiler Works, Brooklyn, N. Y.
McIlvain & Spiegel.....Cincinnati, Ohio.
John Brennan & Co.....Detroit, Mich.
Pennsylvania Boiler Works.....Erie, Pa.
The J. S. Schofield's Sons Co....Macon, Ga.
Manistee Iron Works Co.....Manistee, Mich.
Newport News S. B. & D. D. Co...Newport News, Va.
The Wm. Cramp & Sons S. & E. B. Co., Philadelphia, Pa.
Philadelphia Iron Works.....Philadelphia, Pa.
Thompson Iron Works.....Philadelphia, Pa.
Pusey & Jones Co.....Wilmington, Del.

Railroads and Car Shops.

•The Atchison, Topeka & Santa Fe Ry. System,

Shawnee, Okla.	Barstow, Cal.
Seligman, Ariz.	Fort Madison, Ia.
Cleburn, Tex.	Bakersfield, Cal.
Dodge City, Kas.	Stockton, Cal.
Williams, Ariz.	San Francisco, Cal.
Needles, Cal.	Fresno, Cal.
Richmond, Cal.	

•B. & O. R. R. Co.....Lorain, Ohio.
B. & O. R. R. Co.....Grafton, W. Va.
•Chicago, Burlington & Quincy R. R., Deadwood, S. D.
Chicago, Burlington & Quincy R. R., Havelock, Neb.
•Chicago & Northwestern Rway. Co., Ablemans, Wis.
The Hocking Valley Rway. Co...Columbus, Ohio.
Chicago, Indianapolis & Louisville Rway. Co., La Fayette, Ind.
Des Moines Union Rway. Co.....Des Moines, Ia.
Fonda, Johnstown & Gloversville R. R. Co., Tribes Hill, N. Y.

Refrigeration.

•A. Booth Packing Co.....Astoria, Ore.
•North Pacific Brewing Co.....Astoria, Ore.
•W. W. Boyer & Co.....Baltimore, Md.
Big Rock Creamery Co.....Big Rock, Ills.
•Quincy Market & Cold Storage Co., Boston, Mass.
Andrew Lohr Bottling Co.....Cairo, Ills.
•Schwarzchild & Sulzberger.....Cambridge, Mass.
Boedecker Mfg. Co.....Dallas, Tex.
Davenport Malt & Grain Co.....Davenport, Iowa.
Hammond, Standish & Co.....Detroit, Mich.
Hygeia Refrigerating Co.....Elmira, N. Y.

Refrigeration—Continued.

Cornell Bros., Inc.....Hartley, Ills.
The Crystal Ice & Cold Storage Co., Kenton, Ohio.
•Consumers Ice & Cold Storage Co., Key West, Fla.
•Heilman Brewing Co.....La Crosse, Wis.
Consumers Ice & Fuel Co.....Laredo, Tex.
Clarinda Poultry, Butter & Egg Co., Lincoln, Neb.
•Cornell Bros., Inc.....Maple Park, Ills.
Memphis Cold Storage Warehouse Co., Memphis, Tenn.
•Schwarzchild & Sulzberger.....New York, N. Y.
•Borden's Condensed Milk Co.

McHenry, Ill.	Waterville, N. Y.
West Chicago, Ill.	Pine Bush, N. Y.
Alden, Ill.	Sycamore, N. Y.
Ulster, Pa.	Fair Haven, Conn.
Auburn, Wash.	Marengo, Ills.
Bassetts, Wis.	Richmond, Vt.

•The Bergner & Engels Brewing Co., Philadelphia, Pa.
Philadelphia Warehousing & Cold Storage Co., Philadelphia, Pa.

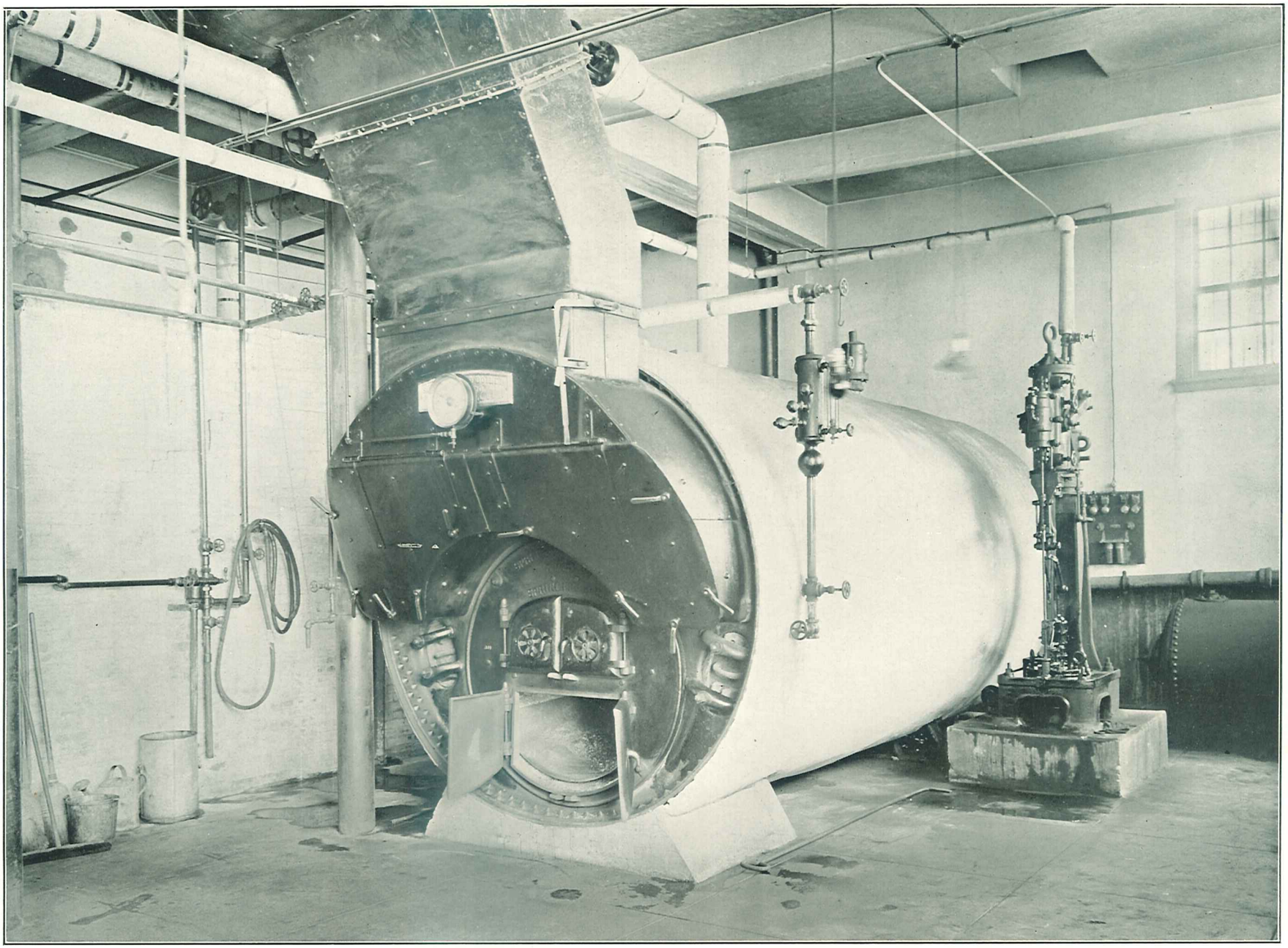
Fabric and Textile Manufacturers.

Racine Feet Knitting Co.....Beloit, Wis.
Thomas Oakes & Co.....Bloomfield, N. J.
International Paper Co.....Brownsville, N. Y. (Ontario Mill.)
•Le Ray Paper Co.....Carthage, N. Y.
Charleston Bagging Co.....Charleston, S. C.
•Royal Bag & Yarn Mfg. Co.....Charleston, S. C.
Paul Guenther.....Dover, N. J.
Swiss Knitting Co.....Dover, N. J.
F. P. Miller Paper Co..... E. Downingtown, Pa.
•O. & W. Thum Co.....Grand Rapids, Mich.
Cons. Water Power & Paper Co..Grand Rapids, Wis.
Rock River Woolen Mills, Inc...Janesville, Wis.
•Brookside Mills .....Knoxville, Tenn.
•American Woolen Mills.....Lawrence, Mass.
Falls City Woolen Mills.....Louisville, Ky.
Louisville Cotton Mills Co.....Louisville, Ky.
George A. Whiting.....Menasha, Wis.
Newburg Bleachery.....Newburg, N. Y.
Textile Mills Corporation.....New Orleans, La. (Lane Mills.)
The Lockport Paper Co.....Niagara Falls, N. Y. (Niagara Falls Mills.)
•Garlock Packing Co.....Palmyra, N. Y.
Racine Woolen Mills, Blake & Co., Racine, Wis.
U. S. Envelope Co.....Springfield, Mass.
United Box Board & Paper Co....Wilmington, Ills. (Wilmington Plant.)

Sugar Planters and Manufacturers.

Rose Hill Sugar Ref. Co.....Abbeville, La.
J. Supple Sons P. & M. Co.....Bayou Goula, La.
Chauffe Bros.....Breaux Bridge, La.
Home Place Plant.....Broussard, La.
C. F. Knoll.....Bunkie, La.
•Cinclare Central Factory.....Cinclare, La.
•The Great Western Sugar Co....Eaton, Colo.
Alexander & Baldwin, Ltd.....Hawaiian Islands.
Moresi, F. & M. Co.....Jeanerette, La.
Lafayette Sugar Ref. Co.....Lafayette, La.
Lower Lafourche Pltg. & M. Co..Lockport, La.

(• Indicates repeat order.)



BOILER PLANT, SCOTT & BOWNE CO. WATSESSING N. J.

Partial List of Installations—continued.

Sugar Planters and Manufacturers—Continued.

- •Adrien Gonsouline.....Loreauville, La.
- L. A. Blouin.....Luling, La.
- Graugnard & Reynaud.....Lyons, La.
- R. McCall.....McCall, La.
- Menominee River Sugar Co.....Menominee, Mich.
- Dugas & Le Blanc.....Paincourtville, La.
- A. J. Lalande.....Plattenville, La.
- L. Godchaux Co., Ltd.....Reserve, La.
- Waguespack & Haydel.....St. Patrick, La.
- Himalaya Pltg. & Mfg. Co.....Tallieu, La.
- E. J. Robichaux Co.....Tallieu, La.
- L. A. Troscalir.....Thibodaux, La.
- Weber-Steib & Co.....Vacherie, La.
- The Wallaceburg Sugar Co., Ltd.Wallaceburg, Ont.

Flour and Cereal Mills.

- •San Jacinto Rice Co.....Beaumont, Tex.
- •Buffalo Cereal Co.....Buffalo, N. Y.
- McMahon Cracker & Biscuit Co..Chicago, Ills.
- The Grafton Roller Mill Co.....Grafton, N. D.
- National Biscuit Co.....Houston, Tex.
- Listman Mill Co.....La Crosse, Wis.
- Lexington Mill & Elevator Co ..Lexington, Neb.
- •National Biscuit Co.....Pittsburgh, Pa.
- Blaker Milling Co.....Pleasanton, Kas.
- Strasburg Steam Flouring Mill..Strasburg, Va.
- J. W. Barwell.....Waukegan, Ills.

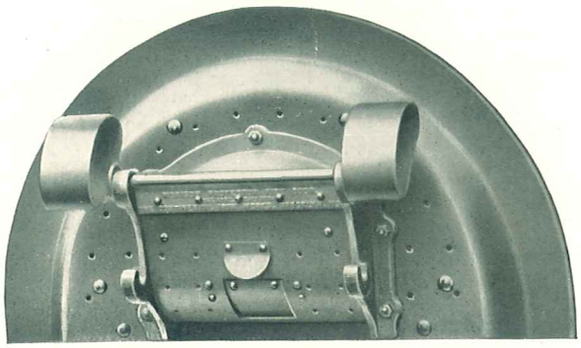
Miscellaneous.

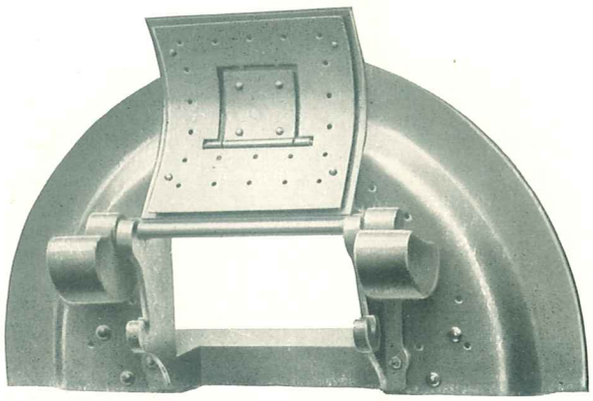
- Ann Arbor Organ Co.....Ann Arbor, Mich.
- •Dunbar & Hopkins.....Ashtabula, Ohio.
- •R. W. Griswold, Jr.....Ashtabula, Ohio.
- The Schwind Quarry Co.....Baltimore, Md.
- C. J. Youse & Co.....Baltimore, Md.
- Higgins Oil & Fuel Co.....Beaumont, Tex.
- F. Bischoff.....Brooklyn, N. Y.
- Cutler Desk Co.....Buffalo, N. Y.
- George P. Smith & Co.....Charles City, Iowa.
- •Dietzen Bros.....Chattanooga, Tenn.
- Dr. Peter Fahrney & Sons Co....Chicago, Ills.
- Garden City Sand Co.....Chicago, Ills.
- C. F. Gunther.....Chicago, Ills.
- Illinois Show Case Works.....Chicago, Ills.
- Illinois Vinegar Mfg. Co.....Chicago, Ills.
- W. W. Kimball Co.....Chicago, Ills.
- Munger's Laundry .....Chicago, Ills.
- Joseph T. Ryerson & Son.....Chicago, Ills.
- •Sanitary Laundry Co.....Chicago, Ills.
- A. G. Spaulding & Bro.....Chicopee Falls, Mass.
- Parmenter & Quackenbush.....Clay, N. Y.
- Kinnison Bros.....Dallas, Tex.
- •The American Fuel Co.....Denver, Colo.
- Kratzer Carriage Co.....Des Moines, Iowa.
- •J. C. Widman & Co.....Detroit, Mich.
- U. S. Lithographing Co.....Elizabethport, N. J.
- Florence Wagon Works.....Florence, Ala.
- Geo. Rall Mfg. Co.....Galesville, Wis.
- Hillview Drainage & Levee District, Hillview, Ill.
- •American Lead Pencil Co.....Hoboken N. J.
- •Atlantic Gulf & Pacific Co.....Honolulu, H. I.
- Hutchinson Kansas Salt Co.....Hutchinson, Kans.
- Interior Hardwood Co.....Johnson City, Tenn.
- Kansas City Cooperage Co.....Kansas City, Mo.
- A. Sutermeister Stone Co.....Kansas City, Mo.
- N. S. Koos & Son.....Kenosha, Wis.
- W. H. Gullet & Sons.....Lincoln, Ill.
- Metal Stamping Co.....Long Island City,N.Y.
- •Union Oil Co.....Los Angeles, Cal.
- Torbitt & Castleman.....Louisville, Ky.
- •Atlantic Gulf & Pacific Co.....Manila, P. I.
- S. C. Toof & Co.....Memphis, Tenn.
- •Henry Loeb & Co.....Memphis, Tenn.
- •The Bostwick Lumber & Mfg. Co..Meridian, Miss.
- W. L. Brubacker & Bro.....Millersburg, Pa.
- •Ballou's White Sand Co.....Millington, Ills.
- Richard Meyer.....New Durham, N. J.
- Breakwater Co.....New Haven, Conn.
- H. B. Ives & Co.....New Haven, Conn.
- •The New River Lumber Co.....New River, Tenn.
- •The New River Lumber Co.....Norma, Tenn.
- Senator W. A. Clark.....New York, N. Y.
- Childs Company.....New York, N. Y.
- D. H. Peery Estate.....Ogden, Utah.
- •Western Cottage Piano & Organ Co., Ottawa, Ill.
- Park City Sampling Mills.....Park City, Utah.
- H. C. Fox & Sons, Inc.....Philadelphia, Pa.
- David Weber & Co.....Philadelphia, Pa.
- J. L. Andreas.....Pierceton, Ind.
- Sawyer & Austin Lumber Co.....Pine Bluff, Ark.
- •Packard Dredging Co.....Providence, R. I.
- Bauman & Murphy.....Racine, Wis.
- B. D. Eisendrath Co.....Racine, Wis.
- Fiebrick-Fox-Hilker Shoe Co.....Racine, Wis.
- •Horlick's Malted Milk Co.....Racine, Wis.
- •S. C. Johnson & Son.....Racine, Wis.
- J. J. Astor Residence...Rhinecliff-on-the-Hudson, N. Y.
- •Bausch & Lomb Optical Co.....Rochester, N. Y.
- Rio Brava Oil Co.....Saratoga, Tex.
- Standard Plate Glass Co.....South Boston, Mass.
- The Minnesota Soap Co.....St. Paul, Minn.
- •White Enamel Refrigerator Works, St. Paul, Minn.
- E. A. Hunt Laundry.....Syracuse, N. Y.
- •Merrill-Soule Co.....Syracuse, N. Y.
- Rogers & Hilton.....Syracuse, N. Y.
- Sandusky Portland Cement Co...Syracuse, Ind.
- Morton Bros.....Taunton, Mass.
- International Creosoting & Construction Co., Texarkana, Tex.
- National Lumber & Creosoting Co..Texarkana, Texas.
- •Searles Bros.....Toledo, Ohio.
- Peerless Portland Cement Co....Union City, Mich.
- The Fowler Co.....Waterloo, Iowa.
- Scott & Bowne.....Watsessing, N. J.
- Western Coal & Dock Co.....Waukegan, Ills.
- •H. H. Williams & Co.....Wauseon, Ohio.
- D. N. Thomas.....Williamsport, Pa.
- G. J. Clark.....Wilkesbarre, Pa.
- •The Canadian Salt Co., Ltd.....Windsor, Ont.
- Imperial Oil Co.....Winnipeg, Manitoba.
- Youngstown Laundry Co.....Youngstown, Ohio.

(• Indicates repeat order.)

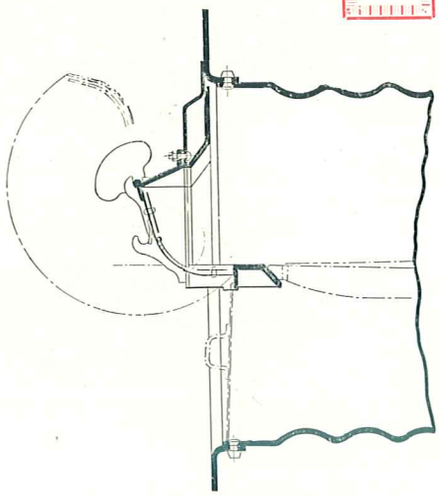
Morison Patent Furnace Front and Door

FOR INTERNAL FURNACE BOILERS.





Unequaled for Economical and Rapid Firing.
Prevents the Destruction of Baffle Plates.



THE MORISON PATENT FURNACE FRONT AND DOOR is intended to overcome some of the defects which are inherent in the present type of furnace doors in use on marine and land boilers. The primary object is to prevent the undue accumulation of fuel on the front end of the grate which causes overheating and ultimate destruction of the furnace door and its attachments, and in consequence of the freedom from obstruction in the front end of the furnace, much better facilities are afforded for properly stoking the fire. To accomplish this, a portion of the dead plate immediately inside of the furnace door is left out, so as to leave a recess. The door is provided with an inward extension, which, when the door is closed, fills the recess in the dead plate. This extension, also the vertical portion of the door, may be perforated and provided with a perforated baffle plate.

THE FURNACE FRONT is made of a plate of pressed steel, worked to the shape indicated in the illustrations and protected from the fire by perforated cast iron liners.

THE FURNACE DOOR is arranged to open upward and is so counterweighted as to remain open while the furnace is being stoked. This is a very important feature in a marine boiler, as it does away with catches or other devices for preventing the door from closing with the motion of the ship. For the purpose of breaking up the fire without opening the main door, a small door in the main door is provided.

ANOTHER VALUABLE FEATURE of the Morison Patent Furnace Door is, that in consequence of the fire being removed from the immediate front of the furnace, the fire room is much cooler, which allows the men to work with more comfort than when the ordinary form of door is used.

THESE FRONTS and DOORS are made of several sizes to suit different size furnaces.

MORISON PATENT FURNACE FRONTS AND DOORS ARE IN USE BY: The British Admiralty, Japanese Navy, U. S. Navy Department, U. S. War Department, U. S. Quartermaster's Department, U. S. Government Printing Office, Cornell Steamboat Company, Rondout, N. Y.; East Boston Ferry Company, Boston, Mass.; Brooklyn Water Works, Ridgewood Station; Consolidated Gas Company, New York; Pusey & Jones Company, Wilmington, Del.; Stamford Mfg. Company, Lynchburg, Va.; Callender, McAuslin & Troop Company, Providence, R. I.; New York, New Haven & Hartford Railroad Co., New Haven, Conn.; Worth Brothers Company, Coatesville, Pa.; Fonda, Johnstown & Gloversville R. R. Co., Tribes Hill, N. Y., and many others.

FOR PRICES and OTHER INFORMATION, address,

THE CONTINENTAL IRON WORKS,

Sole Manufacturers in the United States. NEW YORK (BOROUGH OF BROOKLYN.)


MORISON PATENT FURNACE FRONTS
AND DOORS
FOR NEW YORK SHIPBUILDING CO.,
CAMDEN, N.J.
FOR U.S.A. SUBMARINE MINE SERVICE BOATS.
NOV. 9, 1908.
WARREN E. HILL, PRESIDENT.
CHAS. B. ROWLAND, CHAS. H. CORBETT, VICE PRESIDENTS.
THOS. F. ROWLAND JR. SECY & TREAS.
THE CONTINENTAL IRON WORKS
· BOROUGH OF BROOKLYN. ·
NEW YORK, N.Y.

GEORGE ROHN

Successor to

H. Edwards Rowland

ARTISTIC LITHOGRAPHER AND DESIGNER

221-225 FULTON ST., NEW YORK